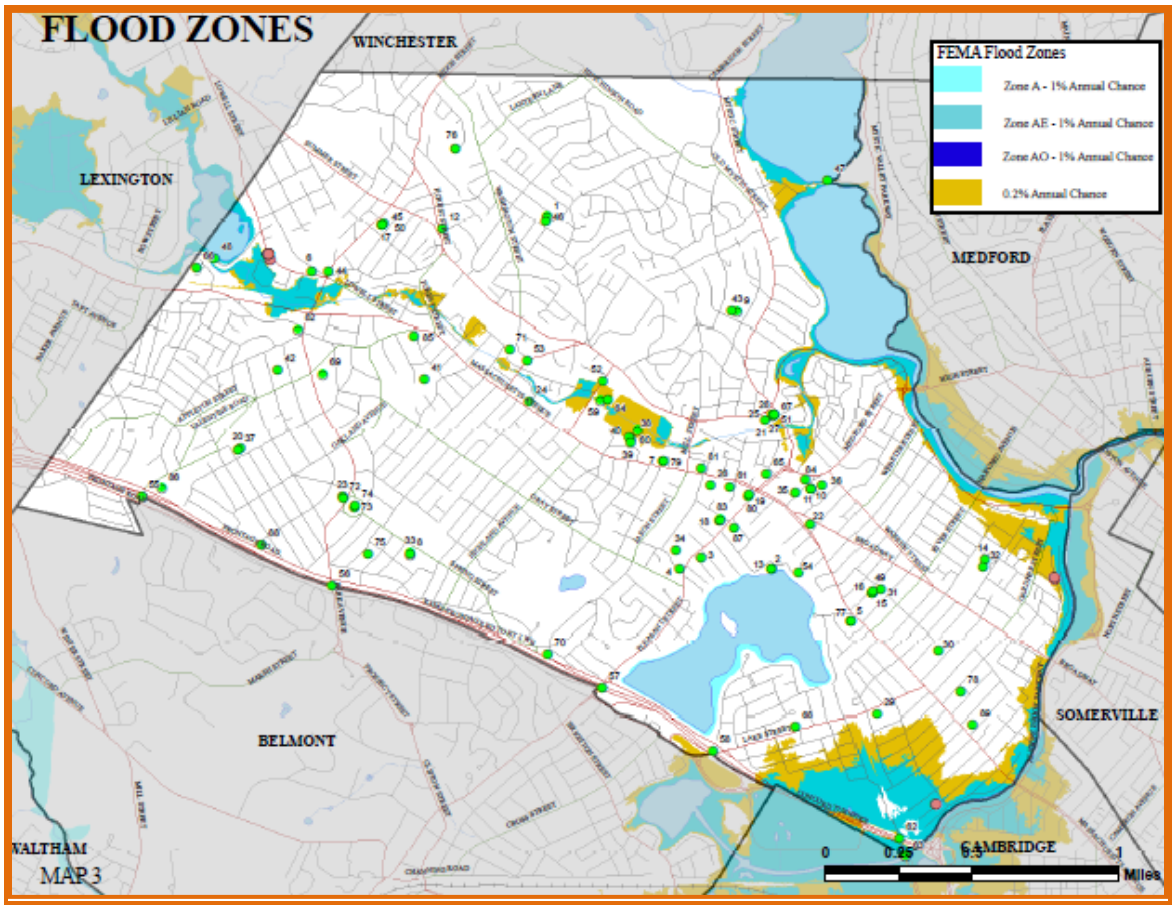
TOWN OF ARLINGTON
HAZARD MITIGATION PLAN



Metropolitan Area Planning Council

Final Plan
Adopted April 30, 2012

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TOWN OF ARLINGTON HAZARD MITIGATION PLAN

ACKNOWLEDGEMENTS AND CREDITS

This plan was prepared for the Town of Arlington by the Metropolitan Area Planning Council (MAPC) under the direction of the Massachusetts Emergency Management Agency (MEMA) and the Massachusetts Department of Conservation and Recreation (DCR). The plan was funded by the Federal Emergency Management Agency's (FEMA) Pre-Disaster Mitigation (PDM) Grant Program.

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I. INTRODUCTION

Planning Requirements under the Federal Disaster Mitigation Act

The Federal Disaster Mitigation Act, passed in 2000, requires that after November 1 2004, all municipalities that wish to continue to be eligible to receive FEMA funding for hazard mitigation grants, must adopt a local multi-hazard mitigation plan. This planning requirement does not affect disaster assistance funding.

Massachusetts has taken a regional approach and has encouraged the regional planning agencies to apply for grants to prepare plans for groups of their member communities. The Metropolitan Area Planning Council (MAPC) received a grant from the Federal Emergency Management Agency (FEMA) under the Pre-Disaster Mitigation (PDM) Program, to assist the Town of Arlington and five other Inner Core West communities to develop their local Hazard Mitigation Plans. The local Hazard Mitigation Plans produced under this grant are designed to meet the requirements of the Disaster Mitigation Act for each community.

In order to address multijurisdictional and regional issues, the participating municipalities were afforded the opportunity to meet with their neighboring communities during plan development, and MAPC has also produced a regional document that summarizes the issues and recommendations for the Inner Core West communities.

What is Hazard Mitigation?

Natural hazard mitigation planning is the process of figuring out how to reduce or eliminate the loss of life and property damage resulting from natural hazards such as floods, earthquakes, and hurricanes. Hazard mitigation means to permanently reduce or alleviate the losses of life, injuries, and property resulting from natural hazards through long-term strategies. These long-term strategies include planning, policy changes, programs, projects, and other activities.

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II. COMMUNITY PROFILE

Overview

Located west of Cambridge and Sommerville, The Town of Arlington is part of the Boston region's Inner Core. Many residents of the town commute to Boston, approximately six miles away, while others are employed in area universities or along the nearby Route 128 corridor. Currently, the town has no manufacturing industry and is predominantly an urban residential community.

Arlington, founded over 350 years ago, remains proud of its history, even as it has grown into a thoroughly modern community. The birthplace of Uncle Sam, the location of the first public children's library, and the site of most of the fighting when the British marched through it returning from the Old North Bridge at the start of the Revolutionary War, Arlington has preserved many of its historical buildings and even recreated its town common. Once a thriving agriculture and mill town, Arlington's excellent access to metropolitan Boston has made it a very desirable place to live.

(Narrative based on information provided by the Town of Arlington on the Town website)

The Town operates under the "Standard Form of Representative Town Meeting Government" according to Massachusetts General Laws Chapter 43A. The Town is governed by a five-member Board of Selectmen with a Town Manager and a Town Meeting made up of 252 representatives, elected from each of the 21 precincts.

According to the 2006-2008 American Community Survey three-year estimate, the population was 42,526 people and there were 19,760 housing units.

The town maintains a website at http://www.town.arlington.ma.us.

Existing Land Use

The most recent land use statistics available from the state are based on aerial photography done in 1999. Table 1 shows the acreage and percentage of land in 21 categories. If the four residential categories are aggregated, residential uses make up 70.4 % of the area of the town. The highest percentage land use is High Density Residential at 67.35 % of the total area.

Table 1
1999 Land Use

Land Use Type	Acres	%
Cropland	0	0
Pasture	0	0
Forest	55.29	1.59
Non-forested wetlands	8.63	0.25
Mining	0	0
Open land	20.37	.59
Participatory recreation	214.9	6.18
Spectator recreation	0	0
Water recreation	3.86	0.11
Multi-family residential	65.5	1.88
High density residential (less than ¼ acre lots)	2343.88	67.35
Medium density residential (¼ - ½ acre lots)	31.2	0.9
Low density residential (larger than ½ acre lot)	9.38	.27
Salt water wetlands	0	0
Commercial	248.99	7.16
Industrial	10.34	0.32
Urban open	180.08	5.17
Transportation	61.75	1.77
Waste disposal	0	0
Water	225.78	6.49
Woody perennials	0	0
Total	***3,479.94***	

For more information on how the land use statistics were developed and the definitions of the categories, please go to http://www.mass.gov/mgis/lus.htm.

Potential Future Land Uses

MAPC consulted with town staff to determine areas that are likely to be developed in the future. These areas are shown on Map 2, "Potential Development" and are described below. The letter for each site corresponds to the letters on Map 2.

A) Brighams property on Mill Street: Planned redevelopment with 116 residential units and some retail.

B) Symmes Hospital Site: Town owns this site; the most recent development proposal fell through and the Town will be seeking new development proposals.

C) Mugar Property: This undeveloped property is located in the floodplain.

Development Trends

The Town of Arlington is largely built out with most of the identified potential future land uses on redevelopment sites and High Density Residential land use making up the highest percentage of the Town's land area. As new development and redevelopment occurs it will be subject to the latest building code requirements and zoning regulations pertaining to wind, earthquakes, and flooding.

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III. PUBLIC PARTICIPATION

Public participation occurred at two levels; the Greater Boston Inner Core West Multiple Hazard Community Planning Team (regional committee) and the Arlington Multiple Hazard Community Planning Team (local committee). In addition, the town held one meeting open to the general public to present the plan and hear citizen input.

Arlington's Participation in the Regional Committee

On March 14, 2008, a letter was sent notifying the communities of the first meeting of the Greater Boston Inner Core West Regional Committee and requesting that the Chief Elected Official designate two municipal employees and/or officials to represent the community. The following individuals were appointed to represent Arlington on the regional committee:

Robert J. Jefferson	Fire Chief
Kevin Shaw	Deputy Chief
Michael Rademacher	Town Engineer

The regional committee serves as an opportunity for neighboring communities to discuss hazard mitigation issues of shared concern. In addition, as the same group of MAPC staff is working on each community's plan, these issues of shared concern, and other issues that may arise between neighboring communities, are discussed in greater detail in local committee meetings and resulting actions are reflected in the identified mitigation measures, as noted in Chapter VIII. The Greater Boston Inner Core West Regional Committee met on April 16, 2008 and December 15, 2008.

The Local Multiple Hazard Community Planning Team

In addition to the regional committee meetings, MAPC worked with the local community representatives to organize a local Multiple Hazard Community Planning Team for Arlington (local committee). MAPC briefed the local representatives as to the desired composition of that team as well as the need for representation from the business community and citizens at large.

The Local Multiple Hazard Community Planning Team Meetings

On April 5, 2010, and May 26, 2010 MAPC conducted the meetings of the Arlington Local Committee. The meetings were organized by Robert J. Jefferson, Fire Chief and Mike Rademacher, Town Engineer. The purpose of the first meeting was to introduce the PDM program, develop hazard mitigation goals, and to gather information on local hazard mitigation issues, existing mitigation practices, and sites or areas related to these. The second meeting focused on verifying information gathered by MAPC staff and discussion of potential mitigation measures and prioritization. Table 2 lists the attendees at each meeting of the team. The agendas for these meetings are included in Appendix A.

Table 2 Attendance at the Arlington Local Committee Meetings	
Name	**Representing**
April 5, 2010	
Robert J. Jefferson	Fire Chief
Michael Rademacher	Town Engineer
John Bean	Public Works
David A. Berry	Planning
Christine Connolly	Public Health
Fred Ryan	Police
May 26, 2010	
Michael Rademacher	Town Engineer
David A. Berry	Planning

The Public Meeting

The plan was introduced to the public at a meeting of the Board of Selectmen on June 21, 2010. The meeting was held in the Arlington Town Hall. The meeting was publicized as a regular Selectmen's meeting. The attendance list for the meeting can be found in Table 3. The plan was made available on the Town's website for public review and comment. During this time that the plan was available online, the meeting and presentation were shown daily on the local cable access channel, Arlington Community Media, Inc, beginning one week after the meeting date and running for two weeks.

Table 3
Attendance at the June 21, 2010 Board of Selectmen's Public Meeting

Name	Representing
Diane Mahon, Chair	Arlington Board of Selectmen
Annie Lacourt, Vice Chair	Arlington Board of Selectmen
Kevin F. Greeley	Arlington Board of Selectmen
John W. Hurd	Arlington Board of Selectmen
Clarissa Rowe	Arlington Board of Selectmen
Brian F. Sullivan	Town Manager
Juliana Rice	Town Counsel
Marie A. Krepelka	Board Administrator
Michael Rademacher	Town Engineer
James Freas	MAPC
Joan Blaustein	MAPC
A number of individuals	General Public

Local Stakeholder Involvement

Town staff were encouraged to reach out to local stakeholders that might have an interest in the Hazard Mitigation Plan including neighboring communities, agencies, businesses, academia, nonprofits, and other interested parties. These stakeholders had an opportunity to participate in the public meeting, which was subject to the requirements of the Open Meeting Law requiring that the agenda for the meeting be advertised in a local paper of general circulation and posted in a public location. Arlington Board of Selectmen agendas are also posted on the Town's website in advance of the meeting. The plan was also available on the web and the presentation from the public meeting shown on community cable, both easily accessible to the various local stakeholders that would have an interest in the plan.

Planning Timeline

March 14, 2008	Letter to the participating municipalities initiating the project.
April 16, 2008	First meeting of the Regional Committee
December 15, 2008	Second Meeting of the Regional Committee
April 5, 2010	First Meeting of the Local Committee
May 26, 2010	Second Meeting of the Local Committee
June 21, 2010	Public Meeting with the Board of Selectmen (Shown daily over a two week period following the meeting on local cable)
August 12, 2010	Plan submitted to MEMA

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IV. OVERVIEW OF HAZARDS AND VULNERABILITY

Overview of Hazards and Impacts

The Massachusetts Hazard Mitigation Plan 2007 (state plan) provides an in-depth overview of natural hazards in Massachusetts. The state plan indicates that Massachusetts is subject to the following natural hazards (listed in order of frequency); floods, heavy rainstorms, nor'easters, coastal erosion, hurricanes, tornadoes, urban and wildfires, drought and earthquakes.

Table 4 summarizes the hazard risks for Arlington. This evaluation takes into account the frequency of the hazard, historical records, and variations in land use. This analysis is based on the vulnerability assessment in the Commonwealth of Massachusetts State Hazard Mitigation Plan, 2007. The statewide assessment was modified to reflect local conditions in Arlington using the definitions for hazard frequency and severity listed below Table 4.

Table 4
Hazard Risks Summary

Hazard	Frequency	Severity
Flooding	High	Serious
Winter storms	High	Serious
Hurricanes	Medium	Serious
Earthquakes	Low	Extensive
Tornadoes	Low	Serious
Landslides	Low	Minor
Brush fires	Medium	Minor
Dam failures	Low	Serious

Definitions used in the Commonwealth of Massachusetts State Hazard Mitigation Plan

Frequency

Very low frequency: events that occur less frequently than once in 1,000 years (less than 0.1% per year)

Low frequency: events that occur from once in 100 years to once in 1,000 years (0.1% to 1% per year);

Medium frequency: events that occur from once in 10 years to once in 100 years (1% to 10% per year);

High frequency: events that occur more frequently than once in 10 years (greater than 10% per year).

Severity

Minor: Limited and scattered property damage; no damage to public infrastructure (roads, bridges, trains, airports, public parks, etc.); contained geographic area (i.e.one or two communities); essential services (utilities, hospitals, schools, etc) not interrupted; no injuries or fatalities.

Serious: Scattered major property damage (more than 50% destroyed); some minor infrastructure damage; wider geographic area (several communities); essential services are briefly interrupted; some injuries and/or fatalities.

Extensive: Consistent major property damage; major damage public infrastructure damage (up to several days for repairs); essential services are interrupted from several hours to several days; many injuries and fatalities.

Catastrophic: Property and public infrastructure destroyed; essential services stopped, thousands of injuries and fatalities.

Flood Related Hazards

Flooding was the most prevalent serious natural hazard identified by local officials in Arlington. Flooding is generally caused by hurricanes, nor'easters, severe rainstorms, and thunderstorms.

Regionally Significant Storms

There have been a number of major rain storms that have resulted in significant flooding in northeastern Massachusetts over the last fifty years. Significant storms include:

- August 1954
- March 1968
- January 1979
- April 1987
- October 1991 ("The Perfect Storm")
- October 1996
- June 1998
- March 2001
- April 2004
- May 2006
- April 2007
- March 2010

Overview of Town-Wide Flooding

Rivers and creeks are the predominant source of potential flood waters in Arlington. The Town is bordered or crossed by three primary waterways, the Upper Mystic River, Mill Brook, and Alewife Brook. In addition, there are a number of ponds and lakes that have some potential to cause flooding; these being Spy Pond, Arlington Reservation, Lower Mystic Lake, and Upper Mystic Lake. Finally, groundwater sourced flooding of basements is relatively common across many different parts of the Town.

Information on flood hazard areas was taken from two sources. The first was the National Flood Insurance Rate Maps. The FIRM flood zones are shown on Map 3 in Appendix B. The second was discussions with local officials. The locally identified areas of flooding described below were identified by Town staff as areas where flooding occurs. These areas do not necessarily coincide with the flood zones from the FIRM maps. They may be areas that flood due to inadequate drainage systems or other local conditions rather than location within a flood zone. The numbers correspond to the numbers on Map 8, "Hazard Areas". The numbers do not reflect priority order.

Locally Identified Areas of Flooding

1) Minuteman Path: During severe storms the Mill Brook jumps the bank here and follows the bike path before flowing back into the creek bed. The stream capacity drops

just after the jump-point, which is the likely cause for the flooding. The issue could be addressed through increasing capacity in the stream or perhaps by purposely capturing floodwaters along the bike path.

2) Forest Street: Road flooding at the low point in the underpass under rail tracks.

3) Brattle Street: Road flooding at the low point in the underpass under rail tracks.

4) Colonial Village: Parking lot and first floor of apartments flood. Flooding on the property occurs as frequently as every two years.

5) Grove Street: Flooding in Wellington Park, Dudley St apartments, and DPW parking lot.

6) Garden Street:

7) East Arlington: Extensive flooding from Alewife Brook and tributaries impacting homes.

8) Sunnyside Avenue: Extensive flooding from Alewife Brook impacting homes.

Repetitive Loss Structures

There are five repetitive loss structures in Arlington, three single family homes and two multi-family residences. These five properties have experienced a total of 31 losses totaling $ 258,929 between 1996 and 2010. As defined by the Community Rating System (CRS) of the National Flood Insurance Program (NFIP), a repetitive loss property is any property which the NFIP has paid two or more flood claims of $1,000 or more in any given 10-year period since 1978. For more information on repetitive losses see http://www.fema.gov/business/nfip/replps.shtm.

The repetitive loss properties are all in or very near locally identified flood areas. The East Arlington property is located in flood zone A, with a 1% annual chance of flooding. The two properties in the Sunnyside Avenue area are located a flood zone with a .2% annual chance of flooding. In or near the Colonial Village flood area are two repetitive loss properties representing several repetitive loss structures that are in or near flood zone A. The first three properties identified above are in the Alewife Brook watershed, while the last two are in the Mill Brook watershed.

Table 5
Repetitive Loss Properties Summary

Structure Type	FEMA Flood Zone	Locally Identified Flooding Area
Multi-Family	A (1%)	Colonial Village
Multi-Family	A (1%)	Colonial Village

Single Family	A (1%)	East Arlington
Single Family	.2%	Sunnyside Avenue
Duplex	.2%	Sunnyside Avenue

Dams and Dam Failure

There are two dams in the Town of Arlington, the Upper Mystic Lake Dam and the Arlington Reservoir Dam.

Upper Mystic Lake Dam – The Upper Mystic Lake Dam is owned and operated by the Massachusetts Department of Conservation and Recreation (DCR) and divides the Upper and Lower Mystic Lakes on Arlington's northeastern boundary. In 2007-2008 the state conducted a Dam Safety Inspection resulting in an overall condition rating of Poor. Inadequate spillway capacity, erosion, and poorly functioning controls were amongst the findings that resulted in this rating. DCR has moved forward with plans to repair and improve the dam and work has already begun. An inundation map was prepared in order to understand the potential impacts of a dam failure, showing the potential for extensive flooding in the floodplain areas of the Mystic River and Alewife Brook with some of the greatest impacts in the East Arlington area. Completion of the repair work will significantly address the potential risk of dam failure.

Arlington Reservoir Dam – The Arlington Reservoir Dam is owned and operated by the Town of Arlington through the Department of Public Works and is located on the Town's boundary with Lexington. While the reservoir is no longer used for water supply, the dam continues to be used to maintain the water level for recreational uses. The water level is raised and lowered seasonally and in anticipation of large storm events to help mitigate downstream flooding in Mill Brook. The dam was declared a hazard by the state in 2004. The Town repaired and improved the dam in 2005, minimizing the potential for dam failure.

Wind Related Hazards

Wind-related hazards include hurricanes and tornadoes as well as high winds during severe rainstorms and thunderstorms. As with many communities, falling trees that result in downed power lines and power outages are an issue in Arlington.

Between 1858 and 2000, Massachusetts has experienced approximately 32 tropical storms, nine Category 1 hurricanes, five Category 2 hurricanes and one Category 3 hurricane. This equates to a frequency of once every six years. A hurricane or storm track is the line that delineates the path of the eye of a hurricane or tropical storm. In 1861 a tropical storm track passed through western Arlington; since then there have been no tropical storm or hurricanes recorded to have tracked through the Town. However, the Town does experience the impacts of the wind and rain of hurricanes and tropical storms regardless of whether the storm track passed through the town. The hazard mapping

indicates that the 100 year wind speed is 110 miles per hour. There has been no recorded tornado within the Town limits.

Winter Storms

In Massachusetts, northeast coastal storms known as nor'easters occur 1-2 times per year. Winter storms are a combination hazard because they often involve wind, ice and heavy snow fall. The average annual snowfall for most of the Town is 48- 72 inches.

The most significant winter storm in recent history was the "Blizzard of 1978," which resulted in over 3 feet of snowfall and multiple day closures of roadways, businesses, and schools. Historically, severe winter storms have occurred in the following years:

Blizzard of 1978	February 1978
Blizzard	March 1993
Blizzard	January 1996
Severe Snow Storm	March 2001
Severe Snow Storm	December 2003
Severe Snow Storm	January 2005

More recently, 2008 was a record year for snowfall. By the end of the February 2008, Boston's Logan International Airport broke a new February record for total precipitation. In March 2008, many cities and towns in Massachusetts exceeded the highest snowfall records. The above-average snowfall that season increased groundwater and surface water levels to a high level, and contributed to flooding experienced in spring 2008.

Fire Related Hazards

Based on discussions with the Arlington Fire Chief, brush fires in Arlington are relatively rare and have generally occurred in only one isolated forested area in the Town off of Thorndike Street in an area called Magnolia Fields, identified as area 9 on Map 8, "Hazard Areas". None of these fires have resulted in major property damage and no loss of life has ever been reported. Brush fires are responded to as a regular fire by the Fire Department. These fires are localized brush fires likely a result of either someone setting a fire or the careless disposal of lit material such as cigarettes or matches.

Geologic Hazards

Geologic hazards include earthquakes, landslides, sinkhole, subsidence, and unstable soils such as fill, peat, and clay. Although new construction under the most recent building codes generally will be built to seismic standards, there are still many structures which pre-date the most recent building code.

Earthquakes

According to the State Hazard Mitigation Plan, New England experiences an average of five earthquakes per year. From 1627 to 1989, 316 earthquakes were recorded in Massachusetts. Most have originated from the La Malbaie fault in Quebec or from the Cape Anne fault located off the coast of Rockport. The region has experienced larger earthquakes, of magnitude 6.0 to 6.5 in 1727 and 1755. Other notable earthquakes occurred here in 1638 and 1663 (Tufts University). There have been no recorded earthquake epicenters within Arlington.

Earthquake Impacts – Earthquakes are a hazard with multiple impacts beyond the obvious building collapse. Buildings may suffer structural damage which may or may not be readily apparent. Earthquakes can cause major damage to roadways, making emergency response difficult. Water lines and gas lines can break, causing flooding and fires. Another potential vulnerability is equipment within structures. For example, a hospital may be structurally engineered to withstand an earthquake, but if the equipment inside the building is not properly secured, the operations at the hospital could be severely impacted during an earthquake. Earthquakes can also trigger landslides.

Landslides

Landslides can result from human activities that destabilize an area or can occur as a secondary impact from another natural hazard such as flooding. In addition to structural damage to buildings and the blockage of transportation corridors, landslides can lead to sedimentation of water bodies.

The entire Town has been classified as having a low risk for landslides.

Critical Infrastructure in Hazard Areas

Critical infrastructure includes facilities that are important for disaster response and evacuation (such as emergency operations centers, fire stations, water pump stations, etc.) and facilities where additional assistance might be needed during an emergency (such as nursing homes, elderly housing, day care centers, etc.). These facilities are listed in Table 6 and are shown on all of the maps in Appendix B.

The purpose of mapping the natural hazards and critical infrastructure is to present an overview of hazards in the community and how they relate to critical infrastructure, to better understand which facilities may be vulnerable to particular natural hazards.

Explanation of Columns in Table 6.

Column 1: ID #: The first column in Table 6 is an ID number which appears on the maps that are part of this plan. See Appendix B.

Column 2: Name: The second column is the name of the site. If no name appears in this column, this information was not provided to MAPC by the community.

Column 3: Type: The third column indicates what type of site it is.

Column 4: Landslide Risk: The fourth column indicates the degree of landslide risk for that site. This information came from NESEC. The landslide information shows areas with either a low susceptibility or a moderate susceptibility to landslides based on mapping of geological formations. This mapping is highly general in nature. For more information on how landslide susceptibility was mapped, refer to http://pubs.usgs.gov/pp/p1183/pp1183.html.

Column 5: FEMA Flood Zone: The fifth column addresses the risk of flooding. A "No" entry in this column means that the site is not within any of the mapped risk zones on the Flood Insurance Rate Maps (FIRM maps). If there is an entry in this column, it indicates the type of flood zone as follows:

Column 6: Locally-Identified Flood Area: The locally identified areas of flooding were identified by town staff as areas where flooding occurs. These areas do not necessarily coincide with the flood zones from the FIRM maps. They may be areas that flood due to inadequate drainage systems or other local conditions rather than location within a flood zone. The numbers correspond to the numbers on Map 8, "Hazard Areas".

Table 6: Relationship of Critical Infrastructure to Hazard Areas					
ID	**NAME**	**TYPE**	**Landslide Risk**	**FEMA Flood Zone**	**Locally-Identified Flood Area**
1	A Place to Grow at the Stratton School	Day Care	Low Susceptibility	No	No
2	ABC Pre-school	Day Care	Low Susceptibility	No	No
3	Another Place to Grow	Day Care	Low Susceptibility	No	No
4	Arlington Children's Center, Inc.	Day Care	Low Susceptibility	No	No
5	Arlington Creative Start	Day Care	Low Susceptibility	No	No
6	Arlington Heights Nursery School	Day Care	Low Susceptibility	No	No
7	Arlington Infant-Toddler Center	Day Care	Low Susceptibility	No	No
8	Brackett After School Program	Day Care	Low Susceptibility	No	No
9	Bright Start After School @ Bishop	Day Care	Low Susceptibility	No	No
10	Fidelity House Preschool	Day Care	Low Susceptibility	No	No
11	Fidelity House School Age Child Care Pro	Day Care	Low Susceptibility	No	No
12	Great Expectations Preschool	Day Care	Low Susceptibility	No	No
13	Kids Care Club	Day Care	Low Susceptibility	No	No
14	Kids Care Club at the Thompson School	Day Care	Low Susceptibility	No	No
15	Learn to Grow	Day Care	Low Susceptibility	No	No

Table 6: Relationship of Critical Infrastructure to Hazard Areas					
ID	**NAME**	**TYPE**	**Landslide Risk**	**FEMA Flood Zone**	**Locally-Identified Flood Area**
16	Lesley Ellis School	Day Care	Low Susceptibility	No	No
17	Peirce Playcare and Extended Day	Day Care	Low Susceptibility	No	No
18	Rogers-Pierce Children's Center	Day Care	Low Susceptibility	No	No
19	Sunshine Nursery School	Day Care	Low Susceptibility	No	No
20	The Afterschool Connection, Inc.	Day Care	Low Susceptibility	No	No
21	Fire Police Support Service (garage)	Municipal Office	Low Susceptibility	No	Garden Street
22	Headquarters Fire Station	Fire Station	Low Susceptibility	No	No
23	Park Circle Fire Station	Fire Station	Low Susceptibility	No	No
24	Highland Fire Station	Fire Station	Low Susceptibility	No	No
25	Arlington Fire Administration	Municipal Office	Low Susceptibility	No	No
26	Arlington Town Hall	Town Hall	Low Susceptibility	No	No
27	Fire/Police Dispatch	Communication Center	Low Susceptibility	No	Garden Street
28	Arlington Police Department	Police Station	Low Susceptibility	No	No
29	Hardy Elementary	School	Low Susceptibility	No	No
30	Dearborn Academy	School	Low Susceptibility	No	No
31	Lesley Ellis School	School	Low Susceptibility	No	No

Table 6: Relationship of Critical Infrastructure to Hazard Areas					
ID	**NAME**	**TYPE**	**Landslide Risk**	**FEMA Flood Zone**	**Locally-Identified Flood Area**
32	Thompson Elementary	School	Low Susceptibility	No	No
33	Brackett	School	Low Susceptibility	No	No
34	Ecole Bilingue School	School	Low Susceptibility	No	No
35	Arlington Catholic HS	School	Low Susceptibility	No	No
36	St Agnes Elementary	School	Low Susceptibility	No	No
37	Cyrus E Dallin	School	Low Susceptibility	No	No
38	Menotomy Preschool	School	Low Susceptibility	.2% Chance	No
39	LABBB Collaborative	School	Low Susceptibility	No	No
40	Arlington High School	School	Low Susceptibility	No	No
41	Ottoson Middle School	School	Low Susceptibility	No	No
42	Germaine Lawrence School (for girls)	Behavioral School	Low Susceptibility	No	No
43	Bishop Elementary School	School	Low Susceptibility	No	No
44	Covenant School	School	Low Susceptibility	No	No
45	Peirce Elementary	School	Low Susceptibility	No	No
46	Stratton Elementary School	School	Low Susceptibility	No	No
47	Upper Mystic Lake Dam	Dam	No	AE	No
48	Arlington Reservoir Dam	Dam	Low Susceptibility	AE	No
49	Kelleher Center	Day Care	Low Susceptibility	No	No

Table 6: Relationship of Critical Infrastructure to Hazard Areas					
ID	**NAME**	**TYPE**	**Landslide Risk**	**FEMA Flood Zone**	**Locally-Identified Flood Area**
50	Mrs T's Company Inc.	Day Care	Low Susceptibility	No	No
51	Community safety building	EOC	Low Susceptibility	No	Garden Street
52	Grove St Bridge	Bridge	Low Susceptibility	.2% Chance	No
53	Brattle St bridge	Bridge	Low Susceptibility	No	Brattle Street
54	Pond Lane Bridge	Bridge	Low Susceptibility	No	No
55	Dow Ave bridge	Bridge	Low Susceptibility	No	No
56	Park Ave bridge	Bridge	Low Susceptibility	No	No
57	Pleasant St bridge	Bridge	Low Susceptibility	No	No
58	Lake St bridge	Bridge	Low Susceptibility	No	No
59	DPW office	Municipal Office	Low Susceptibility	No	Grove St
60	Municipal admin (in HS)	Municipal Office	Low Susceptibility	No	No
61	Library	Municipal Office	Low Susceptibility	No	No
62	Minuteman man under rte 2	Bridge	Low Susceptibility	AE	East Arlington / Alewife
63	Alewife brook bridge	Bridge	Low Susceptibility	.2% Chance	East Arlington / Alewife
64	DPW garage	Municipal Office	Low Susceptibility	.2% Chance	Grove St
65	Winslow Towers	Elderly Housing	Low Susceptibility	No	No
66	Drake Village	Elderly Housing	Low Susceptibility	No	No
67	Cusack Building	Elderly Housing	Low Susceptibility	No	Garden Street
68	Lake St Nursing Home	Nursing Home	Low Susceptibility	No	No

Table 6: Relationship of Critical Infrastructure to Hazard Areas					
ID	**NAME**	**TYPE**	**Landslide Risk**	**FEMA Flood Zone**	**Locally-Identified Flood Area**
69	Park Ave Nursing and Rehab Center	Nursing Home	Low Susceptibility	No	No
70	Spring St Pumping Station	Pumping Station	Low Susceptibility	No	No
71	Brattle Court Pumping Station	Pumping Station	Low Susceptibility	No	No
72	Park Circle Fire Station (Towers)	Communication Towers	Low Susceptibility	No	No
73	Park Circle Tower (1,000,000 gallons)	WaterTank	Low Susceptibility	No	No
74	Park Circle Tower	Communication Towers	Low Susceptibility	No	No
75	Bellington St Underground Water Tank	Underground Water Tank	Low Susceptibility	No	No
76	Turkey Hill Water Tank	Water Tank	Low Susceptibility	No	No
77	Calvary Church, United Methodist	Places of Assembly	Low Susceptibility	No	No
78	Church of Our Saviour	Places of Assembly	Low Susceptibility	No	No
79	First Baptist Church	Places of Assembly	Low Susceptibility	No	No
80	First Parish Unitarian Universalist Chur	Places of Assembly	Low Susceptibility	No	No
81	Highrock Church	Places of Assembly	Low Susceptibility	No	No
82	Park Avenue Congregational Church, UCC	Places of Assembly	Low Susceptibility	No	No

Table 6: Relationship of Critical Infrastructure to Hazard Areas					
ID	**NAME**	**TYPE**	**Landslide Risk**	**FEMA Flood Zone**	**Locally-Identified Flood Area**
83	Pleasant Street Congregational Church	Places of Assembly	Low Susceptibility	No	No
84	Saint Agnes Parish	Places of Assembly	Low Susceptibility	No	No
85	Saint Athanasius Greek Orthodox Church	Places of Assembly	Low Susceptibility	No	No
86	Saint Camillus	Places of Assembly	Low Susceptibility	No	No
87	St. John's Episcopal Church	Places of Assembly	Low Susceptibility	No	No
88	St. Paul Lutheran Church	Places of Assembly	Low Susceptibility	No	No
89	Trinity Baptist Church	Places of Assembly	Low Susceptibility	No	No

Vulnerability Assessment

The purpose of the vulnerability assessment is to estimate the extent of potential damages from natural hazards of varying types and intensities. A vulnerability assessment and estimation of damages was performed for hurricanes, earthquakes, and flooding. The methodology used for hurricanes and earthquakes was the HAZUS-MH software. The methodology for flooding was developed specifically to address the issue in many of the communities where flooding was not solely related to location within a floodplain.

Introduction to HAZUS-MH

HAZUS- MH (multiple-hazards) is a computer program developed by FEMA to estimate losses due to a variety of natural hazards. The following overview of HAZUS-MH is taken from the FEMA website. For more information on the HAZUS-MH software, go to http://www.fema.gov/plan/prevent/hazus/index.shtm

> "HAZUS-MH is a nationally applicable standardized methodology and software program that contains models for estimating potential losses from earthquakes, floods, and hurricane winds. HAZUS-MH was developed by the Federal Emergency Management Agency (FEMA) under contract with the National Institute of Building Sciences (NIBS). Loss estimates produced by HAZUS-MH are based on current scientific and engineering knowledge of the effects of hurricane winds, floods and earthquakes. Estimating losses is essential to decision-making at all levels of government, providing a basis for developing and evaluating mitigation plans and policies as well as emergency preparedness, response and recovery planning..
>
> HAZUS-MH uses state-of-the-art geographic information system (GIS) software to map and display hazard data and the results of damage and economic loss estimates for buildings and infrastructure. It also allows users to estimate the impacts of hurricane winds, floods and earthquakes on populations."

There are three modules included with the HAZUS-MH software: hurricane wind, flooding, and earthquakes. There are also three levels at which HAZUS-MH can be run. Level 1 uses national baseline data and is the quickest way to begin the risk assessment process. The analysis that follows was completed using Level 1 data.

Level 1 relies upon default data on building types, utilities, transportation, etc. from national databases as well as census data. While the databases include a wealth of information on the nine communities that are a part of this study, it does not capture all relevant information. In fact, the HAZUS training manual notes that the default data is "subject to a great deal of uncertainty."

However, for the purposes of this plan, the analysis is useful. This plan is attempting to only generally indicate the possible extent of damages due to certain types of natural disasters and to allow for a comparison between different types of disasters. Therefore,

this analysis should be considered to be a starting point for understanding potential damages from the hazards. If interested, communities can build a more accurate database and further test disaster scenarios.

Estimated Damages from Hurricanes

According to the State Hazard Mitigation Plan, between 1858 and 2000, there were 15 hurricanes. 60% were Category 1, 33% were Category 2 and 7% were Category 3. For the purposes of this plan, Category 2 and a Category 4 storms were chosen to illustrate damages. The Category 4 storm was included in order to present a reasonable "worst case scenario" that would help planners and emergency personnel evaluate the impacts of storms that might be more likely in the future, as we enter into a period of more intense and frequent storms.

Table 7
Estimated Damages from Hurricanes

	Category 2	**Category 4[1]**
Building Characteristics		
Estimated total number of buildings	12,199	12,199
Estimated total building replacement value (Year 2002 $) (Millions of Dollars)	$3,883	$3,883
Building Damages		
# of buildings sustaining minor damage	12	223
# of buildings sustaining moderate damage	1	23
# of buildings sustaining severe damage	0	0
# of buildings destroyed	0	0
Population Needs		
# of households displaced	0	123
# of people seeking public shelter	0	26
Debris		
Building debris generated (tons)	0	8,685.5
Tree debris generated (tons)	0	3,212.5
# of truckloads to clear building debris	0	347
Value of Damages (Thousands of dollars)		
Total property damage	$.08	$48,340.82
Total losses due to business interruption	$1.88	$6,052.34

[1]No Category 4 or 5 hurricanes have been recorded in New England. However, a Category 4 hurricane was included to help the communities understand the impacts of a hurricane beyond what has historically occurred in New England.

Estimated Damages from Earthquakes

Methodology Used

In order to assess damages from earthquakes, the HAZUS-MH earthquake module was used. For more information, see the description of the HAZUS-MH software above. The HAZUS earthquake module allows users to define a number of different types of earthquakes and to input a number of different parameters. The module is more useful where there is a great deal of data available on earthquakes. In New England, defining the parameters of a potential earthquake is much more difficult because there is little historical data. The earthquake module does offer the user the opportunity to select a number of historical earthquakes that occurred in Massachusetts. For the purposes of this plan, two earthquakes were selected: a 1963 earthquake with a magnitude of 5.0 and an earthquake with a magnitude of 7.0.

Table 8
Estimated Damages from Earthquakes

	Magnitude 5.0	**Magnitude 7.0**
Building Characteristics		
Estimated total number of buildings	12,199	12,199
Estimated total building replacement value (Year 2002 $)(Millions of dollars)	$3,883	$3,883
Building Damages		
# of buildings sustaining slight damage	481	3,132
# of buildings sustaining moderate damage	106	1,463
# of buildings sustaining extensive damage	13	370
# of buildings completely damaged	1	77
Population Needs		
# of households displaced	27	792
# of people seeking public shelter	5	167
Debris		
Building debris generated (tons)	Not available	Not available
Value of Damages (Millions of dollars)		
Total property damage	$60.72	$298.31
Total losses due to business interruption	$2.3	$45.89

Estimated Damages from Flooding

Methodology Used

MAPC did not use HAZUS-MH to estimate flood damages in Arlington. In addition to technical difficulties with the software, the riverine module is not a reliable indicator of flooding in areas where inadequate drainage systems contribute to flooding even when those structures are not within a mapped flood zone. In lieu of using HAZUS, MAPC developed a methodology to give a rough approximation of flood damages.

Arlington is 5.44 square miles or 3,479.94 acres. Approximately 239.5 acres have been identified by local officials as areas of flooding. This amounts to 6.9 % of the land area in Arlington. The number of structures in each flood area was estimated by applying the percentage of the total land area to the number of structures (12,199) in Arlington; the same number of structures used by HAZUS for the hurricane and earthquake calculations. HAZUS uses a value of $260,920.43 per structure for the building replacement value. This was used to calculate the total building replacement value in each of the flood areas. The calculations were done for a low estimate of 10% building damages and a high estimate of 50% as suggested in the FEMA September 2002 publication, "State and Local Mitigation Planning how-to guides". (Page 4-13). The range of estimates for flood damages is *$78,276.13- $64,316,886*. These calculations are not based solely on location within the floodplain or a particular type of storm (i.e. 100 year flood).

Table 9
Estimated Damages from Flooding

ID	Flood Hazard Area	Approximate Area in Acres	% of Total Land Area in Arlington	# of Structures	Replacement Value	Low Estimate of Damages	High Estimate of Damages
1	Minuteman Path	3.219	0.092	11	$2,870,124.73	$287,012.47	$1,435,062.37
2	Forest Street	.758	0.022	3	$782,761.29	$78,276.13	$391,380.65
3	Brattle Street	1.12	0.032	4	$1,043,681.72	$104,368.17	$521,840.86
4	Colonial Village	6.294	0.181	22	$5,740,249.46	$574,024.95	$2,870,124.73
5	Grove Street	5.055	0.145	18	$4,696,567.74	$469,656.77	$2,348,283.87
6	Garden Street	9.907	0.285	35	$9,132,215.05	$913,221.51	$4,566,107.53

Table 9
Estimated Damages from Flooding

ID	Flood Hazard Area	Approximate Area in Acres	% of Total Land Area in Arlington	# of Structures	Replacement Value	Low Estimate of Damages	High Estimate of Damages
7	East Arlington / Alewife	140.689	4.043	493	$128,633,772	$12,863,377.2	$64,316,886
8	Sunnyside Avenue	72.512	2.084	254	$66,273,789.2	$6,627,378.92	$33,136,894.6
Totals		***239.554***	***6.883***	***840***	***$219,173,161***	***$21,917,316.1***	***$109,586,581***

Future Development in Hazard Areas

The Town of Arlington has identified three parcels where development has been proposed, is underway, or is expected to occur in the future. Table 10 shows the relationship of these parcels to two of the mapped hazards. This information is provided so that planners can ensure that development proposals meet all flood plain zoning and that careful attention is paid to drainage issues.

Table 10: Relationship of Potential Development to Hazard Areas

Parcel	**Landslide risk**	**Flood Zone**
Brighams on Mill Street	Low	26.4493% in AE
Symmes Hospital Site	Low	No
Mugar Property	Low	83.8704% in AE

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V. EXISTING MITIGATION MEASURES

Existing Multi-Hazard Mitigation Measures

Comprehensive Emergency Management Plan (CEMP) – Every community in Massachusetts is required to have a Comprehensive Emergency Management Plan. These plans address mitigation, preparedness, response and recovery from a variety of natural and man-made emergencies. These plans contain important information regarding flooding, hurricanes, tornadoes, dam failures, earthquakes, and winter storms. Therefore, the CEMP is a mitigation measure that is relevant to all of the hazards discussed in this plan.

Communications Equipment – The Town has access to three Incident Command Units, mobile communications centers available to the town through the MA State Police, the MA Dept. of Fire Services, Middlesex County Sheriff's Office, and MEMA.

Emergency Power Generators – Emergency power generators can be found in the Stratton School and the Gibbs building. Both of these are natural gas run generators intended only to provide emergency lighting in the event of a power failure.

Massachusetts State Building Code – The Massachusetts State Building Code contains many detailed regulations regarding wind loads, earthquake resistant design, flood-proofing, and snow loads.

Local Emergency Management Planning Committee (LEPC) - Arlington has its own Local Emergency Planning Committee**.**

Existing Flood Hazard Mitigation Measures

National Flood Insurance Program (NFIP) – Arlington participates in the NFIP with 497 policies in force as of the end of 2009. FEMA maintains a database on flood insurance policies and claims. This database can be found on the FEMA website at http://www.fema.gov/business/nfip/statistics/pcstat.shtm
The following information is provided for the Town of Arlington:

Flood insurance policies in force (as of December 31, 2009)	497
Coverage amount of flood insurance policies	$67,906,600
Premiums paid	$167,483
Total losses (all losses submitted regardless of the status)	350
Closed losses (Losses that have been paid)	301
Open losses (Losses that have not been paid in full)	1
CWOP losses (Losses that have been closed without payment)	48
Total payments (Total amount paid on losses)	$751,158.95

The Town complies with the NFIP by enforcing floodplain regulations, maintaining up-to-date floodplain maps, and providing information to property owners and builders regarding floodplains and building requirements.

Street sweeping – All streets are swept at least once annually in the spring and approximately two thirds of the streets are swept a second time in the fall. Those streets in commercial areas are swept once a month.

Catch basin cleaning – There are approximately 2,000 catch basins in the Town and they are cleaned out by municipal crews once every two years.

Roadway treatments – The Town uses road salt pre-whetted with Ice-Ban Magic.

Zoning Regulations – Zoning is intended to protect the public health and safety through the regulation of land use. The Arlington Zoning Ordinance includes a Floodplain District (Section 11.04). The objectives of this district are to promote:

1. The health and safety of the occupants of lands subject to seasonal or periodic flooding in the Mill Brook, Alewife Brook, Mystic River, and Mystic Lakes floodplain, as shown on the zoning overlay map of the Town of Arlington.
2. To prevent the reduction of the water-carrying capacity of streams, brooks, rivers, and drainage courses by prohibiting the destruction or alteration of their natural character, and by preventing encroachment by future development, both public and private, in the floodway. A floodway includes the normal channel of a river or stream and those portions of the floodplains adjoining the normal channel which are reasonably required to carry off the flood flow.
3. The preservation of the natural flood control characteristics and the water storage capacity of the floodplain.
4. To protect the public from hazard and loss through the regulation of future development of lands adjoining such watercourses.
5. The safety and purity of water; control and containment of sewage; safety of gas, electric, fuel, and other utilities from breaking, leaking, short-circuiting, grounding, igniting, electrocuting or any other dangers due to flooding.

The Floodplain District is an overlay district, defined by the 100-year floodplain as designated by FEMA. Within the District, by-right uses are limited to agricultural or park/recreational uses. An existing structure may be expanded to a limited extent. Other uses, as allowed in the underlying zoning district, may be allowed by Special Permit, providing that it can be demonstrated that the proposed construction will not increase flood elevations by more than 1 inch and that the project complies with applicable wetland regulations.

This plan recommends that the Floodplain District be amended to add the following to what must be present for a special permit to be granted:

Section of the Massachusetts State Building Code which addresses floodplain areas (currently 780 CMR 2102.0, "Flood Resistant Construction").

Stormwater By-Law – The Town of Arlington Stormwater By-Law (Article 15) requires that for any development of a previously undeveloped property with a proposed impervious area of greater than 500 square feet or for the redevelopment of a property in which the area of impervious surface will increase by more than 350 square feet there shall be no net increase in the surface water runoff rate relative to the predevelopment runoff rate.

Environmental Design Review Regulation – Large scale, non-residential development or redevelopment as well as any proposed development in certain areas of the Town are subject to the Environmental Design Review Regulation. On these sites, special attention is given to surface water drainage to ensure that there is no adverse impact on neighboring properties or the public storm drainage system. The regulations encourage measures to prevent erosion, minimize impervious areas, and stormwater treatment.

Wetlands Protection By-Law - The Town of Arlington Wetlands Protection By-Law (Article 8) protects water resources, wetlands, and their adjoining land areas by controlling activities that might have a significant or cumulative impact on the recognized values of these resource areas, including their ability to serve as a flood control and storm damage prevention feature. Any activity that might fill or otherwise alter these resource areas requires a permit from the Arlington Conservation Commission, which is required to include conditions necessary to protect these recognized values. The adjoining land area under the protection of this by-law includes land within 100 feet of a pond or wetland and land within 200 feet of a river or stream.

DCR dam safety regulations – The state has enacted dam safety regulations mandating inspections and emergency action plans. All new dams are subject to state permitting.

Great Meadows – Great Meadows is a 183 acre natural resource conservation area owned by the Town of Arlington in the Town of Lexington, upstream on Mill Brook. Consisting of a rich mosaic of wetland and upland environments, Arlington completed a stewardship plan for the area in 2001. Amongst the numerous natural resource values identified with this property was its value in helping to control flooding downstream in Mill Brook. The report further states that development of the property could result in increased flooding in downstream areas.

Arlington Open Space and Recreation Plan (OSRP)- Arlington's OSRP identifies Elizabeth Island and the Mugar Land for acquisition as open space. Both properties are located in floodplain areas.

Tri-Community Group – Arlington, Belmont, and Cambridge have formed a Tri-community stormwater group out of a shared concern for the serious impact that surface flooding and sewage backflows have in each community.

Existing Wind Hazard Mitigation Measures

Massachusetts State Building Code – The town enforces the Massachusetts State Building Code whose provisions are generally adequate to protect against most wind damage. The code's provisions are the most cost-effective mitigation measure against tornados given the extremely low probability of occurrence. If a tornado were to occur, the potential for severe damages would be extremely high.

Tree-trimming program – The Town conducts its own tree maintenance and also uses its own equipment to trim and remove trees as needed and grind stumps.

Existing Winter Hazard Mitigation Measures

Snow disposal –The town conducts general snow removal operations with its own equipment. The Town does not currently have a place adequate for snow disposal. The parking lot of the Arlington Reservoir has been considered as one snow dumping site.

Existing Brush Fire Hazard Mitigation Measures

Outdoor Burning Not Permitted – Outdoor burning is not allowed in Arlington.

Development Review – The Fire Department participates in the review of new development projects on a case by case basis.

Existing Geologic Hazard Mitigation Measures

Massachusetts State Building Code – The State Building Code contains a section on designing for earthquake loads (780 CMR 1612.0). Section 1612.1 states that the purpose of these provisions is "to minimize the hazard to life to occupants of all buildings and non-building structures, to increase the expected performance of higher occupancy structures as compared to ordinary structures, and to improve the capability of essential facilities to function during and after an earthquake". This section goes on to state that due to the complexity of seismic design, the criteria presented are the minimum considered to be "prudent and economically justified" for the protection of life safety. The code also states that absolute safety and prevention of damage, even in an earthquake event with a reasonable probability of occurrence, cannot be achieved economically for most buildings.

Section 1612.2.5 sets up seismic hazard exposure groups and assigns all buildings to one of these groups according to a Table 1612.2.5. Group II includes buildings which have a substantial public hazard due to occupancy or use and Group III are those buildings having essential facilities which are required for post-earthquake recovery, including fire, rescue and police stations, emergency rooms, power-generating facilities, and communications facilities.

Table 11- Arlington Existing Mitigation Measures			
Type of Existing Mitigation Measures	**Area Covered**	**Effectiveness/ Enforcement**	**Improvements/ Changes Needed**
MULTIPLE HAZARDS			
Comprehensive Emergency Management Plan (CEMP)	Town-wide.	Emphasis is on emergency response.	None.
Communications Equipment	Town-wide.	Effective	
Massachusetts State Building Code	Town-wide.	Effective for new construction.	None.
Emergency Power Generators	Town-wide.	Effective.	Upgrade generators as needed; provide generators at additional locations; provide alternative fuel sources and generator power source flexibility.
Participation in the Local Emergency Planning Committee (LEPC)	Town-wide.	A forum for inter-departmental cooperation on natural and manmade disasters.	None.
FLOOD HAZARDS			
Participation in the National Flood Insurance Program (NFIP)	Areas identified on the FIRM maps.	There are 497 policies in force.	Encourage all eligible homeowners to obtain insurance.
Street sweeping	Town-wide.	Effective.	None.
Catch basin cleaning	Town-wide.	Effective.	None.
Roadway treatments	Town roads.	Effective.	None.
Zoning – Floodplain District	Town-wide.	Effective for new construction.	Add compliance with state building code standards for floodplains to requirements for a special permit.

Table 11- Arlington Existing Mitigation Measures			
Type of Existing Mitigation Measures	**Area Covered**	**Effectiveness/ Enforcement**	**Improvements/ Changes Needed**
Stormwater By-Law	Town-wide.	Effective for new construction.	
Environmental Design Review Regulation	Limited areas	Effective for new construction.	
Wetlands Protection By-Law	Resource Areas	Effective	
DCR Dam Safety Regulations	Dams	Effective	
Arlington Reservoir	Mill Brook downstream	Somewhat effective.	
Great Meadows	Mill Brook downstream	Effective	Ensure permanent protection from development.
Arlington OSRP	Proposed conservation areas	Effective if implemented.	Purchase identified properties and hold for conservation.
Tri-Community Group	Three communities	Effective	Follow-up studies.
WIND HAZARDS			
The Massachusetts State Building Code	Town-wide.	Effective for most situations except severe storms	None.
Tree trimming program	Town-wide.	Satisfactory.	
WINTER HAZARDS			
There are no specific measures beyond regular salting and sanding of the roads and local plowing**.**			
BRUSH FIRE HAZARDS			
Outdoor burning prohibited	Town-wide.	Effective.	None.
Development Review	Town-wide.	Effective.	None.
GEOLOGIC HAZARDS			
The Massachusetts State Building Code	Town-wide.	Effective for most situations.	None.

VI. HAZARD MITIGATION GOALS AND OBJECTIVES

The Arlington Local Multiple Hazard Community Planning Team met on May 26, 2010. At that meeting, the team reviewed and discussed a draft set of goals and objectives for the Town of Arlington. The following eight goals were endorsed by the team for the Arlington Hazard Mitigation Plan:

1. Prevent and reduce the loss of life, injury, public health impacts and property damages resulting from all major natural hazards.

2. Identify and seek funding for measures to mitigate or eliminate each known significant flood hazard area.

3. Integrate hazard mitigation planning as an integral factor in all relevant municipal departments, committees and boards.

4. Prevent and reduce the damage to public infrastructure resulting from all hazards.

5. Encourage the business community, major institutions and non-profits to work with the Town to develop, review and implement the hazard mitigation plan.

6. Work with surrounding communities, state, regional and federal agencies to ensure regional cooperation and solutions for hazards affecting multiple communities.

7. Ensure that future development meets federal, state and local standards for preventing and reducing the impacts of natural hazards.

8. Take maximum advantage of resources from FEMA and MEMA to educate Town staff and the public about hazard mitigation.

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VII. POTENTIAL MITIGATION MEASURES

What is hazard mitigation?

Hazard mitigation means to permanently reduce or alleviate the losses of life, injuries and property resulting from natural and human-made hazards through long-term strategies. These long-term strategies include planning, policy changes, programs, projects and other activities. FEMA currently has three mitigation grant programs: the Hazards Mitigation Grant Program (HGMP), the Pre-Disaster Mitigation program (PDM), and the Flood Mitigation Assistance (FMA) program. The three links below provide additional information on these programs.

http://www.fema.gov/government/grant/hmgp/index.shtm

http://www.fema.gov/government/grant/pdm/index.shtm

http://www.fema.gov/government/grant/fma/index.shtm

Process for Setting Priorities for Mitigation Measures

The decision on priorities was made at a meeting of the local committee. Priority setting was based on local knowledge of the hazard areas, cost information and an assessment of benefits.

MAPC staff attended the FEMA Benefit-Cost Analysis Training Course on October 24-25, 2007. Information from this training was shared with local officials in order to help them understand the role of a benefit/cost analysis in developing and evaluating potential mitigation projects.

Based on information gained from the Benefit-Cost Analysis trainings and a review of the STAPLEE criteria (a checklist for evaluating social, technical, administrative, political, legal, economic and environmental issues) MAPC asked the local committee to take into consideration factors such as the number of homes and businesses affected, whether or not road closures occurred and what impact closures had on delivery of emergency services and the local economy, anticipated project costs, whether the town had the technical and administrative capability to carry out the mitigation measures, whether any environmental constraints existed, and whether the town would be able to justify the costs relative to the anticipated benefits.

The listing of high, medium, and other potential mitigation measures is provided in the sections below and summarized in Table 11.

High Priority Mitigation Measures

Flooding, Drainage Infrastructure and Dams

A) Minuteman Path: Construct water conveyance pipes to take flood waters off the commuter path or reconstruct the path to a higher level of durability / flood water resistance.

B) East Arlington / Alewife: Acquire open space areas as conservation area. Place conservation easement or otherwise restrict future development of the properties.

C) Colonial Village: Develop and implement a strategy to flood proof the apartment buildings. Consider methods to reduce storm water volume as well, including permeable paving and other low impact development techniques.

D) Sunnyside Ave: Develop and implement a strategy to protect the houses and apartment buildings, coordinating with the proposed DCR bike path along the Alewife Brook as appropriate.

E) Eliminate sanitary sewer overflows: Arlington is currently engaged in a 12 year program to reduce or eliminate sanitary sewer overflows by preventing storm water inflow into sewer pipes.

Multi-hazard

F) Purchase mobile, long-running generators and/or install fixed, multi-fuel generators in designated emergency shelters.

G) Purchase hand-held GPS units and mobile radio communications equipment.

H) Upgrade all generators as needed; provide alternative fuel sources and generator power source flexibility.

Measures to Ensure Compliance with NFIP

I) Update town Flood Information Rate Maps (FIRM) maps information and update town bylaw.

J) Acquire priority open space parcels for many uses including maintaining flood storage and water infiltration capacity.

Medium Priority Mitigation Measures

Flooding, Drainage Infrastructure and Dams

K) Forest & Brattle Streets: Install pump systems to remove flood water from the low areas beneath the two railroad bridge underpasses.

L) East Arlington / Alewife and Sunnyside Ave: Once other mitigation measures in these areas have been implemented, acquire or elevate houses that continue to experience flooding.

M) Grove Street: Relocate the Department of Public Works building and create flood water storage capacity on the site.

N) Garden Street: Acquire or elevate houses that regularly experience flooding.

O) Dedicate more resources for more frequent maintenance of town-owned drainage facilities, such as more frequent removal of sediment.

P) The Tri-Community Working Group identified a number of potential flood mitigation measures in their 2004 report. The three communities should consider following up on some of the additional studies identified.

Q) Study the causes and potential solutions to groundwater sourced flooding related to high groundwater tables. This flooding is found in scattered locations throughout Arlington and neighboring localities within the Alewife Brook watershed and mostly impacts basements during severe storms. If possible, create a map and GIS shapefile of the areas where this flooding is most likely to occur.

R) Begin to study the feasibility of creating a stormwater utility to help pay for drainage system maintenance and improvements.

S) Create, based on existing data, a web-based GIS wetlands mapping capacity.

T) Develop a larger capacity for emergency flood preparation and emergency police details.

High Winds and Hurricanes

U) Increase available funds for tree maintenance program.

Earthquakes

V) Investigate options to make all public municipal buildings earth-quake resistant.

Winter Storms

W) Identify a new snow dumping / storage location.

Low Priority Mitigation Measures

Flooding, Drainage Infrastructure and Dams

X) Develop a stronger wetlands, erosion control and stormwater education and outreach program for town residents and builders.

Y) Complete locating of all storm drains and catch basins into town GIS data base.

Introduction to Potential Mitigation Measures (Table 12)

Description of the Mitigation Measure – The description of each mitigation measure is brief and cost information is given only if cost data were already available from the community. The cost data represent a point in time and would need to be adjusted for inflation and for any changes or refinements in the design of a particular mitigation measure.

Priority – The designation of high, medium, or low priority was done at the meeting of the Local Multiple Hazard Community Planning Team meeting. The designations reflect discussion and a general consensus developed at the meeting but could change as conditions in the community change. . In determining project priorities, the local team considered potential benefits and project costs.

Implementation Responsibility – The designation of implementation responsibility was done by MAPC based on a general knowledge of what each municipal department is responsible for. It is likely that most mitigation measures will require that several departments work together and assigning staff is the sole responsibility of the governing body of each community.

Time Frame – The time frame was based on a combination of the priority for that measure, the complexity of the measure and whether or not the measure is conceptual, in design, or already designed and awaiting funding. Because the time frame for this plan is five years, the timing for all mitigation measures has been kept within this framework. The identification of a likely time frame is not meant to constrain a community from taking advantage of funding opportunities as they arise.

Potential Funding Sources – This column attempts to identify the most likely sources of funding for a specific measure. The information on potential funding sources in this table is preliminary and varies depending on a number of factors. These factors include whether or not a mitigation measure has been studied, evaluated or designed, or if it is still in the conceptual stages. MEMA and DCR assisted MAPC in reviewing the potential eligibility for hazard mitigation funding. Each grant program and agency has specific eligibility requirements that would need to be taken into consideration. In most instances, the measure will require a number of different funding sources. Identification of a potential funding source in this table does not guarantee that a project will be eligible for, or selected for funding. Upon adoption of this plan, the local committee responsible for its implementation should begin to explore the funding sources in more detail.

Additional information on funding sources – The best way to determine eligibility for a particular funding source is to review the project with a staff person at the funding agency. The following websites provide an overview of programs and funding sources.

> Army Corps of Engineers (ACOE) – The website for the North Atlantic district office is http://www.nae.usace.army.mil/. The ACOE provides assistance in a

number of types of projects including shoreline/streambank protection, flood damage reduction, flood plain management services and planning services.

Massachusetts Emergency Management Agency (MEMA) – The grants page http://www.mass.gov/dem/programs/mitigate/grants.htm has a useful table that compares eligible projects for the Hazard Mitigation Grant Program and the Flood Mitigation Assistance Program.

United States Department of Agriculture – The USDA has programs by which communities can get grants for firefighting needs. See the link below for some example.

http://www.rurdev.usda.gov/rd/newsroom/2002/cfg.html

Abbreviations Used in Table 12

FEMA Mitigation Grants includes:
- FMA = Flood Mitigation Assistance Program.
- HMGP = Hazard Mitigation Grant Program.
- PDM = Pre-Disaster Mitigation Program

ACOE = Army Corps of Engineers.

MHD = Massachusetts Highway Department.

EOT = Executive Office of Transportation.

DCR = Department of Conservation and Recreation

DHS/EOPS = Department of Homeland Security/Emergency Operations

EPA/DEP (SRF) = Environmental Protection Agency/Department of Environmental Protection (State Revolving Fund)

USDA = United States Department of Agriculture

Table 12 Arlington Potential Mitigation Measures						
Hazard Area	**Mitigation Measure**	**Priority**	**Implementation Responsibility**	**Time Frame**	**Estimated Cost**	**Potential Funding Sources**
High Priority						
A) Minuteman Path	Reconstruct or improve to withstand flooding.	High	DPW	2010- 2013	TBD	Arlington/FEMA
B) East Arlington / Alewife	Acquire open space for conservation.	High	Planning	2010- 2013		Arlington/FEMA
C) Colonial Village	Flood proof apartment buildings.	High	DPW & Planning	2011- 2014	TBD	Arlington/FEMA
D) Sunnyside Ave	Protect homes from flooding.	High	DPW & Planning	2011-2014	TBD	Arlington/FEMA
E) Eliminate Sanitary Sewer Overflows	Continue program to eliminate.	High	DPW	2010 - 2015		Arlington/MWRA
F) Multi-hazard	Purchase mobile, long-running generators and/or install fixed, multi-fuel generators in designated emergency shelters	High	Fire Department	2010- 2015	$20,000 per mobile or $50,000 per fixed generator	Arlington/FEMA
G) Multi-hazard	Purchase hand-held GPS units and mobile radio communications equipment	High	Fire Department	2008 -2013	TBD	Arlington/FEMA/ DCR/US Forest Service
H) Multi-hazard	Upgrade all generators as needed; provide alternative	High	Police/DPW/Fire	2010 -2015	$50,000 per new fixed	Arlington/FEMA

Table 12
Arlington Potential Mitigation Measures

Hazard Area	Mitigation Measure	Priority	Implementation Responsibility	Time Frame	Estimated Cost	Potential Funding Sources
	fuel sources and generator power source flexibility				generator.	
Measures to Ensure Compliance with NFIP						
I) Land Protection	Acquire priority open space parcels for many uses including maintaining flood storage and water infiltration capacity.	High	Planning	2010- 2015	TBD	Arlington/DCR/ Community Preservation Act
J) FIRM mapping and bylaws	Update town Flood Information Rate Maps (FIRM) maps information and update town bylaw.	High	DPW	2010-2012	TBD	Arlington
Medium Priority						
K) Forest & Brattle Streets	Install pumps to remove flood water in low areas of the road.	Medium	DPW	2013-2015	TBD	Arlington/FEMA
L) East Arlington / Alewife & Sunnyside Ave	Program to acquire or elevate homes (for homes still experiencing flooding after other measures have been implemented).	Medium	Planning	2015	TBD	Arlington / FEMA
M) Grove Street	Relocate DPW building and create flood water	Medium	DPW and Planning	2014-2015	TBD	Arlington/FEMA

Table 12
Arlington Potential Mitigation Measures

Hazard Area	Mitigation Measure	Priority	Implementation Responsibility	Time Frame	Estimated Cost	Potential Funding Sources
	storage.					
N) Garden Street	Acquire or elevate homes.	Medium	DPW and Planning	2014-2015	TBD	Arlington/FEMA
O) Flooding, Drainage Infrastructure and Dams	Dedicate more resources for more frequent maintenance of town-owned drainage facilities, such as more frequent removal of sediment.	Medium	DPW	2010 – 2015	TBD	Arlington
P) Flooding, Drainage Infrastructure and Dams	Follow-up on studies identified in the 2004 Tri-Community Working Group Report.	Medium	Community Development	2010-2015	TBD	Arlington / Belmont / Cambridge
Q) Flooding, Drainage Infrastructure and Dams	Study groundwater sourced flooding	Medium	Community Development	2010-2015	TBD	Belmont/ Arlington/ Watertown/others
R) Flooding, Drainage Infrastructure and Dams	Study feasibility of creating stormwater utility	Medium	DPW	2010 – 2011	$5,000	Arlington
S) Flooding, Drainage Infrastructure and Dams	Create, based on existing data, a web-based GIS wetlands mapping capacity.	Medium	Conservation Commission	2010 - 2012	$5,000	Arlington/DCR

Table 12
Arlington Potential Mitigation Measures

Hazard Area	Mitigation Measure	Priority	Implementation Responsibility	Time Frame	Estimated Cost	Potential Funding Sources
T) Flooding, Drainage Infrastructure and Dams	Develop greater emergency flood preparation and emergency response capacity.	Medium	DPW/Police/Fire	2010- 2015	TBD	Arlington/FEMA
U) High Winds and Hurricanes	Increase available funds for tree maintenance program.	Medium	DPW	2010 -2013	TBD	Arlington
V) Earthquakes	Investigate options to make all public buildings earthquake resistant.	Medium	Fire Department	2010-2015	TBD	Arlington/FEMA
W) Winter Storms	Identify a new snow dumping location.	Medium	DPW	2010 – 2013	TBD	Arlington
X) Drainage Infrastructure	Complete locating of all storm drains and catch basins into town GIS data base.	Low	DPW	Ongoing	$5,000	Arlington
Y) Stormwater and Erosion Control Outreach and Education	Develop a stronger wetlands, erosion control, and stormwater education outreach program for town residents and builders	Low	Conservation Commission	2010 – 2012	$5,000	Arlington

VIII. REGIONAL AND INTER-COMMUNITY CONSIDERATIONS

Some hazard mitigation issues are strictly local. The problem originates primarily within the municipality and can be solved at the municipal level. Other issues are inter-community issues that involve cooperation between two or more municipalities. There is a third level of mitigation which is regional; involving a state, regional, or federal agency or an issue that involves three or more municipalities.

Regional Partners

In many communities, mitigating natural hazards, particularly flooding, is more than a local issue. The drainage systems that serve these communities are a complex system of storm drains, roadway drainage structures, pump stations and other facilities owned and operated by a wide array of agencies including but not limited to the Town of Arlington, the Department of Conservation and Recreation (DCR), the Massachusetts Water Resources Authority (MWRA), Massachusetts Highway Department (MHD) and the Massachusetts Bay Transportation Authority (MBTA). The planning, construction, operations and maintenance of these structures are integral to the flood hazard mitigation efforts of communities. These agencies must be considered the communities regional partners in hazard mitigation. These agencies also operate under the same constraints as communities do including budgetary and staffing constraints and numerous competing priorities. In the sections that follow, the plan includes recommendations for activities to be undertaken by these other agencies. Implementation of these recommendations will require that all parties work together to develop solutions.

Inter-Community Considerations

Alewife Brook

The nature of the Alewife Brook basin has characteristics that make the area prone to flooding even before the introduction of an urbanized environment with large amounts of impervious surfaces and drainage systems. Urbanization of this environment has therefore only exacerbated these issues, with the result that there are significant amounts of flooding from the Alewife Brook and its tributaries, particularly in portions of Cambridge and Arlington. In an attempt to collectively understand and begin to address this issue, Arlington, Belmont, and Cambridge have together formed a Tri-Community Working Group, which issued a progress report in June, 2004.

The report identifies a number of topics for future study. Among those is analysis of the effects of the relatively low bridges over the brook and how these may constrain floodwaters leading to greater flooding. The working group could also consider developing a shared set of low-impact design (LID) standards targeting storm water controls for development projects in the respective communities and a shared outreach program encouraging property owners to take greater steps to retain storm water on their properties, thereby keeping some portion of the storm water out of the conveyance

system and potentially reducing flooding in the brook. There are a number of other potential projects that would benefit all three communities that could be explored through this working group.

While the Tri-Community report indicates that the Amelia Earhart Dam on the Mystic River has sufficient pumping capacity to ensure that floodwaters are conveyed downstream, since the report's publication there is consensus that a fourth pump is critical to addressing flooding in the Alewife Brook area as larger storms in recent years have led to more numerous flooding events.

Groundwater Sourced Flooding

A number of communities in this part of the region experience a relatively high incidence of groundwater sourced flooding in basements including Arlington, Belmont, and Watertown. This flooding appears to be linked to high water tables created by clay layers in the soil. Areas that flood appear to be scattered across these communities and in each of the above towns, local staff indicated that they did not have an accurate way to predict exactly where or when basement flooding might occur. These communities might benefit from sharing the cost of investigating the causes of this flooding, mapping the most likely areas impacted, and developing awareness programs for property owners.

IX. PLAN ADOPTION AND MAINTENANCE

Plan Adoption

The Arlington Hazard Mitigation Plan was adopted by the Board of Selectmen on April 30, 2012. See Appendix D for documentation. The plan was approved by FEMA on [ADD DATE] for a five-year period that will expire on [ADD DATE].

Plan Maintenance

MAPC worked with the Arlington Hazard Mitigation Planning Team to prepare this plan This group will continue to meet on an as-needed basis to function as the Local Hazard Mitigation Implementation Group, with one town official designated as the coordinator. Additional members could be added to the local implementation group from businesses, non-profits and institutions.

Implementation Schedule

Bi-Annual Survey on Progress– The coordinator of the Hazard Mitigation Implementation Team will prepare and distribute a biannual survey in years two and four of the plan. The survey will be distributed to all of the local implementation group members and other interested local stakeholders. The survey will poll the members on any changes or revisions to the plan that may be needed, progress and accomplishments for implementation, and any new hazards or problem areas that have been identified.

This information will be used to prepare a report or addendum to the local hazard mitigation plan. The Hazard Mitigation Implementation Team will have primary responsibility for tracking progress and updating the plan.

Develop a Year Four Update – During the fourth year after initial plan adoption, the coordinator of the Hazard Mitigation Implementation Team will convene the team to begin to prepare for an update of the plan, which will be required by the end of year five in order to maintain approved plan status with FEMA. The team will use the information from the year four biannual review to identify the needs and priorities for the plan update.

Prepare and Adopt an Updated Local Hazard Mitigation Plan – FEMA's approval of this plan is valid for five years, by which time an updated plan must be approved by FEMA in order to maintain the town's approved plan status and its eligibility for FEMA mitigation grants. Because of the time required to secure a planning grant, prepare an updated plan, and complete the approval and adoption of an updated plan, the local Hazard Mitigation Planning Team should begin the process by the end of Year 3. This will help the town avoid a lapse in its approved plan status and grant eligibility when the current plan expires.

At this point, the Hazard Mitigation Implementation Team may decide to undertake the update themselves, contract with the Metropolitan Area Planning Council to update the plan or to hire another consultant. However the Hazard Mitigation Implementation Team

decides to update the plan, the group will need to review the current FEMA hazard mitigation plan guidelines for any changes. The update of the Arlington Hazard Mitigation Plan will be forwarded to MEMA and DCR for review and to FEMA for approval.

Integration of the Plans with Other Planning Initiatives

Upon approval of the Arlington Hazard Mitigation Plan by FEMA, the Local Hazard Mitigation Implementation Team will provide all interested parties and implementing departments with a copy of the plan and will initiate a discussion regarding how the plan can be integrated into that department's ongoing work. At a minimum, the plan will be reviewed and discussed with the following departments:

- Fire / Emergency Management
- Police
- Public Works / Highway
- Engineering
- Planning and Community Development
- Conservation
- Parks and Recreation
- Health
- Building

Other groups that will be coordinated with include large institutions, Chambers of Commerce, land conservation organizations and watershed groups. The plans will also be posted on a community's website with the caveat that local team coordinator will review the plan for sensitive information that would be inappropriate for public posting. The posting of the plan on a web site will include a mechanism for citizen feedback such as an e-mail address to send comments.

X. LIST OF REFERENCES

In addition to the specific reports listed below, much of the technical information for this plan came from meetings with town department heads and staff.

Town of Arlington, Town By-laws, Title V, Article 15, Storm Water Mitigation.

Town of Arlington Zoning Bylaw

Town of Arlington Open Space and Recreation Plan Update, 2007-2012

Town of Arlington, Natural Resource Inventory & Stewardship Plan of Arlington's Great Meadows in Lexington, July 2001.

Commonwealth of Massachusetts, MacConnell Land Use Statistics, 1999

Federal Emergency Management Agency, Flood Insurance Rate Maps for Arlington, MA, 2010

Metropolitan Area Planning Council, Geographic Information Systems Lab

Metropolitan Area Planning Council, Regional Plans and Data

Tri-Community Working Group, Progress Report, June 2004

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APPENDIX A
MEETING AGENDAS

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Don Boyce
DIRECTOR

dcr

Richard Sullivan
COMMISSIONER

MAPC

Marc D. Draisen
EXECUTIVE DIRECTOR

GREATER BOSTON PRE-DISASTER MTITGATION PLAN

UPPER NORTH SHORE Regional Hazard Mitigation Team
Danvers
Essex
Gloucester
Hamilton
Ipswich
Manchester
Middleton
Rockport
Wenham

INNER CORE-WEST Regional Hazard Mitigation Team
Arlington
Belmont
Newton
Waltham
Watertown
Welleslely

SOUTH SHORE Regional Hazard Mitigation Team
Duxbury
Norwell

The Commonwealth of Massachusetts

Deval Patrick, Governor

Massachusetts Emergency Management Agency
400 WORCESTER ROAD, FRAMINGHAM, MA 01702-5399 508-820-2000 FAX 508-820-1404

Department of Conservation and Recreation
251 CAUSEWAY STREET, SUITE 600-900, BOSTON, MA 02114-2104 617-626-1250 FAX 617-626-1351

Metropolitan Area Planning Council
60 TEMPLE PLACE, 6TH FLOOR, BOSTON, MA 02111 617-451-2770 FAX 617-482-7185

Hazard Mitigation Community Planning Team
Greater Boston / Inner Core-West

First Meeting

WEDNESDAY, APRIL 16, 2008, 10:00 AM
Waltham Government Center
119 School Street, Waltham
Meeting Room 5 (lower level)

AGENDA

10:00 WELCOME & INTRODUCTIONS *(Please sign contact sheet)*

10:10 OVERVIEW OF FEDERAL DISASTER MITIGATION ACT & PRE-DISASTER MITIGATION PLANNING

- Presentation, Questions & Discussion
  --Martin Pillsbury, Manager of Regional Planning, MAPC

10:30 GETTING STARTED: THE HAZARD MITIGATION PLAN FOR THE INNER CORE-WEST COMMUNTIES

- Review of Scope of Work & Schedule
- Questions & Discussion – Local Issues & Priorities

10:50 PREVIEW OF MAPPING AND DATABASES FOR THE PLAN

- Examples from the North Shore & Metro Boston PDM Plans
  --Alan Bishop, GIS Manager, MAPC

11:20 NEXT STEPS / MEETING SCHEDULE

11:30 ADJOURN

Don Boyce
DIRECTOR

dcr

Richard Sullivan
COMMISSIONER

MAPC

Marc D. Draisen
EXECUTIVE DIRECTOR

GREATER BOSTON PRE-DISASTER MTITGATION PLAN

UPPER NORTH SHORE Regional Hazard Mitigation Team
Danvers
Essex
Gloucester
Hamilton
Ipswich
Manchester
Middleton
Rockport
Wenham

INNER CORE-WEST Regional Hazard Mitigation Team
Arlington
Belmont
Newton
Waltham
Watertown
Wellesley

SOUTH SHORE Regional Hazard Mitigation Team
Duxbury
Norwell

The Commonwealth of Massachusetts

Deval Patrick, Governor

Massachusetts Emergency Management Agency
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Metropolitan Area Planning Council
60 TEMPLE PLACE, 6TH FLOOR, BOSTON, MA 02111 617-451-2770 FAX 617-482-7185

Hazard Mitigation Community Planning Team
Greater Boston / Inner Core-West

Second Meeting

MONDAY, DECEMBER 15, 2008, 10:00 AM

Waltham Government Center
119 School Street, Waltham
Public Meeting Room (lower level)

AGENDA

10:00 WELCOME, INTRODUCTIONS & OVERVIEW OF AGENDA

10:05 REVIEW OF HAZARD MAPPING AND CRITICAL INFRASTRUCTURE DATA COLLECTION

- *Allan Bishop, GIS Manager, will present an overview of the draft Critical Facilities database and community hazard maps*

10:45 UPDATE ON LOCAL PLANS

- *Martin Pillsbury and Christine Wallace will review progress and next steps for developing the local PDM Plans for each community*

11:00 SETTING GOALS AND OBJECTIVES FOR THE REGIONAL PDM PLAN

- *Martin Pillsbury will in review goals and objectives and ask the team to discuss priorities for the Inner Core - West communities (see attachment)*

11:20 NEXT STEPS / MEETING SCHEDULE

Meeting Agenda
Local Multiple Hazard Community Planning Team
Arlington, MA

April 5, 2010 9:00-10:30 AM
Community Safety Building, 112 Mystic St, 1st Floor EOC

I. Overview of Project Scope and Status

II. Review of Critical Infrastructure Mapping

III. Identification of Goals

IV. Identification of Hazard Areas and Future Development

V. Discussion of Existing Mitigation Practices in Arlington and Preliminary Discussion of Potential Proposed Practices

VI. Next Steps

Meeting Agenda
Local Multiple Hazard Community Planning Team
Arlington, MA

May 26, 2010 10:00-11:30 AM
Community Safety Building, 112 Mystic St, 1st Floor EOC

1. Welcome, Introductions
2. Introduce Arlington Hazard Mitigation Planning map series and digitized ortho photo showing Areas of Concern—check for accuracy and edit as needed
3. Review and edit Arlington Mitigation Matrix as needed- set priority projects
4. Introduce STAPLE/E project rating criteria
5. Set draft goals for Hazard Mitigation Plan
6. Next steps: 1) Finalize mitigation measures; 2) submit draft plan to Work Group for comment; 3) submit draft for grant application

Project Overview - MAPC received a grant to prepare natural hazards *Pre-Disaster Mitigation Plan* for the communities of Arlington, Belmont, Newton, Waltham, Wellesley, and Watertown. MAPC is working with the six communities to develop a plan to mitigate potential damages of natural hazards such as floods, winter storms, hurricanes, earthquakes and wild fires, before such hazards occur. The federal *Disaster Mitigation Act of 2000* requires that all municipalities adopt a *Pre-Disaster Mitigation Plan* for natural hazards in order to remain eligible for FEMA Disaster Mitigation Grants.

This FEMA planning program is separate from new or ongoing homeland security initiatives, and is focused solely on addressing natural hazards, although some of the data collected for this plan may be useful for other aspects of emergency planning as well.

APPENDIX B
HAZARD MAPPING

The MAPC GIS (Geographic Information Systems) Lab produced a series of maps for each community. Some of the data came from the Northeast States Emergency Consortium (NESEC). More information on NESEC can be found at http://www.serve.com/NESEC/. Due to the various sources for the data and varying levels of accuracy, the identification of an area as being in one of the hazard categories must be considered as a general classification that should always be supplemented with more local knowledge. The documentation for some of the hazard maps was incomplete as well.

The map series consists of four panels with two maps each plus one map taken from the State Hazard Mitigation Plan.

Map 1.	Population Density
Map 2.	Potential Development
Map 3.	Flood Zones
Map 4.	Earthquakes and Landslides
Map 5.	Hurricanes and Tornadoes
Map 6.	Average Snowfall
Map 7.	Composite Natural Hazards
Map 8.	Hazard Areas

Map1: Population Density – This map uses the US Census block data for 2000 and shows population density as the number of people per acre in seven categories with 60 or more people per acre representing the highest density areas.

Map 2: Potential Development – This map shows potential future developments, and critical infrastructure sites. MAPC consulted with town staff to determine areas that were likely to be developed or redeveloped in the future.

Map 3: Flood Zones – The map of flood zones used the FEMA NFIP Flood Zones as its source. For more information, refer to the FEMA Map Service Center website http://www.msc.fema.gov. The definitions of the flood zones are described in detail on this site as well. The flood zone map for each community also shows critical infrastructure and municipally owned and protected open space.

Map 4: Earthquakes and Landslides – This information came from NESEC. For most communities, there was no data for earthquakes because only the epicenters of an earthquake are mapped.

The landslide information shows areas with either a low susceptibility or a moderate susceptibility to landslides based on mapping of geological formations. This mapping is

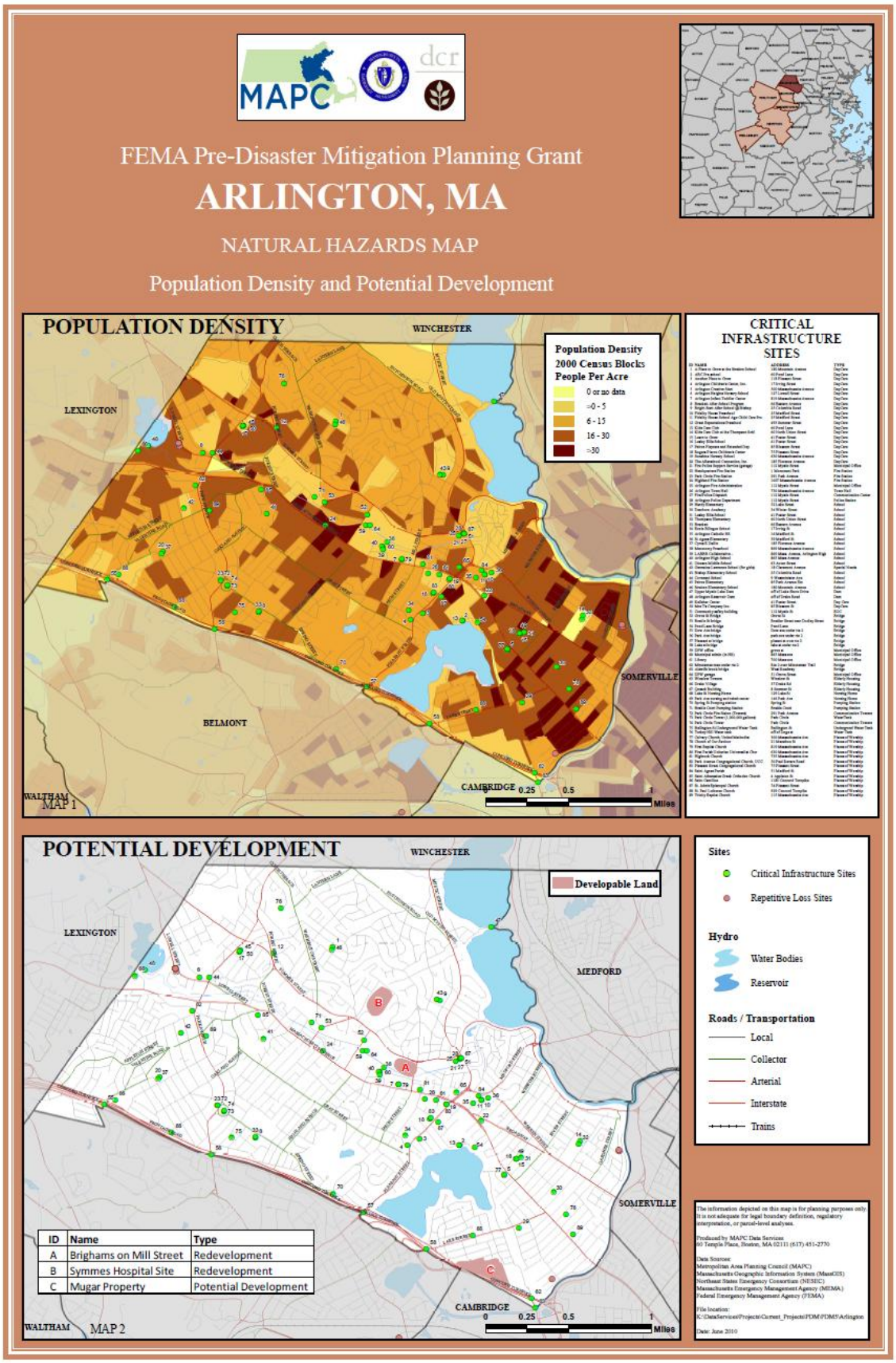
highly general in nature. For more information on how landslide susceptibility was mapped, refer to http://pubs.usgs.gov/pp/p1183/pp1183.html.

Map 5: Hurricanes and Tornadoes – This map shows a number of different items. The map includes the storm tracks for both hurricanes and tropical storms. This information must be viewed in context. A storm track only shows where the eye of the storm passed through. In most cases, the effects of the wind and rain from these storms were felt in other communities even if the track was not within that community. This map also shows the location of tornadoes with a classification as to the level of damages. What appears on the map varies by community since not all communities experience the same wind-related events. These maps also show the 100 year wind speed.

Map 6: Average Snowfall - - This map shows the average snowfall and open space. It also shows storm tracks for nor'easters, if any storms tracked through the community.

Map 7: Composite Natural Hazards - This map shows four categories of composite natural hazards for areas of existing development. The hazards included in this map are 100 year wind speeds of 110 mph or higher, low and moderate landslide risk, FEMA Q3 flood zones (100 year and 500 year) and hurricane surge inundation areas. Areas with only one hazard were considered to be low hazard areas. Moderate areas have two of the hazards present. High hazard areas have three hazards present and severe hazard areas have four hazards present.

Map 8: Hazard Areas – For each community, locally identified hazard areas are overlaid on an aerial photograph dated April, 2008. The critical infrastructure sites are also shown. The source of the aerial photograph is Mass GIS.

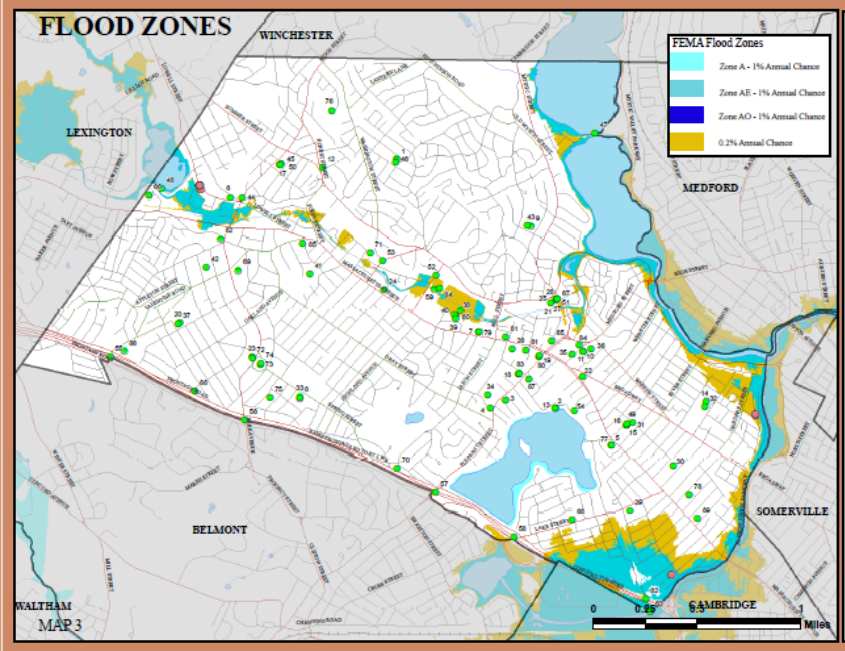

MAPC
dcr
FEMA Pre-Disaster Mitigation Planning Grant
ARLINGTON, MA
NATURAL HAZARDS MAP
Population Density and Potential Development
POPULATION DENSITY
WINCHESTER
LEXINGTON
SOMERVILLE
BELMONT
CAMBRIDGE
WALTHAM
MAP 1
Population Density
2000 Census Blocks
People Per Acre
0 or no data
=0 - 5
6 - 15
16 - 30
=30
0 0.25 0.5 1 Miles
CRITICAL INFRASTRUCTURE SITES
POTENTIAL DEVELOPMENT
Developable Land
MEDFORD
ID Name Type
A Brigham's on Mill Street Redevelopment
B Symmes Hospital Site Redevelopment
C Mugar Property Potential Development
MAP 2
Sites
Critical Infrastructure Sites
Repetitive Loss Sites
Hydro
Water Bodies
Reservoir
Roads / Transportation
Local
Collector
Arterial
Interstate
Trains

FEMA Pre-Disaster Mitigation Planning Grant

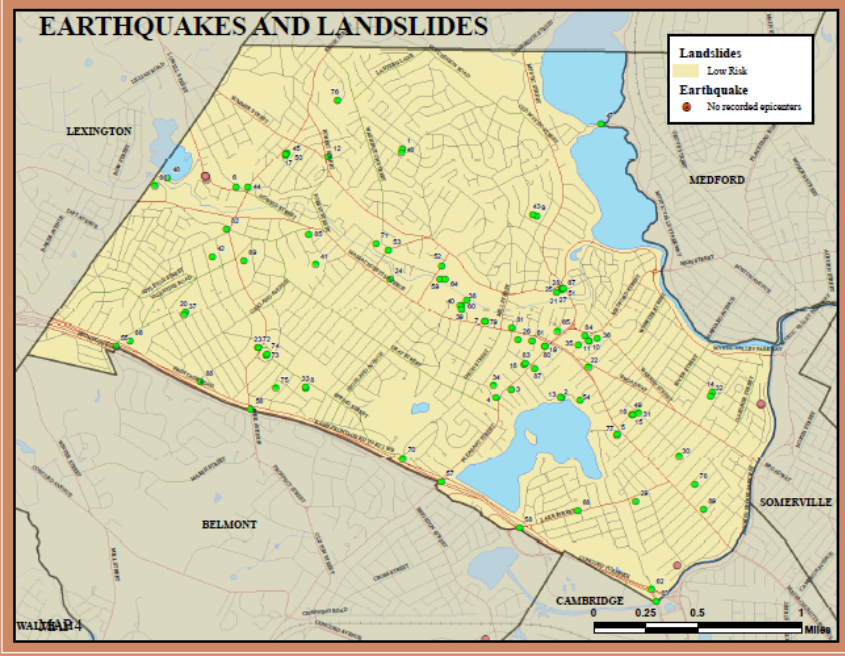
ARLINGTON, MA

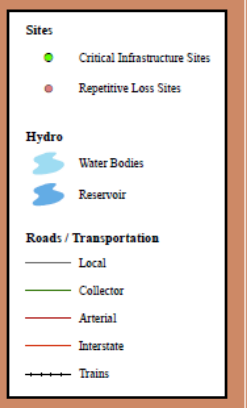
NATURAL HAZARDS MAP

Flood Zones and Earthquake / Landslides



CRITICAL INFRASTRUCTURE SITES





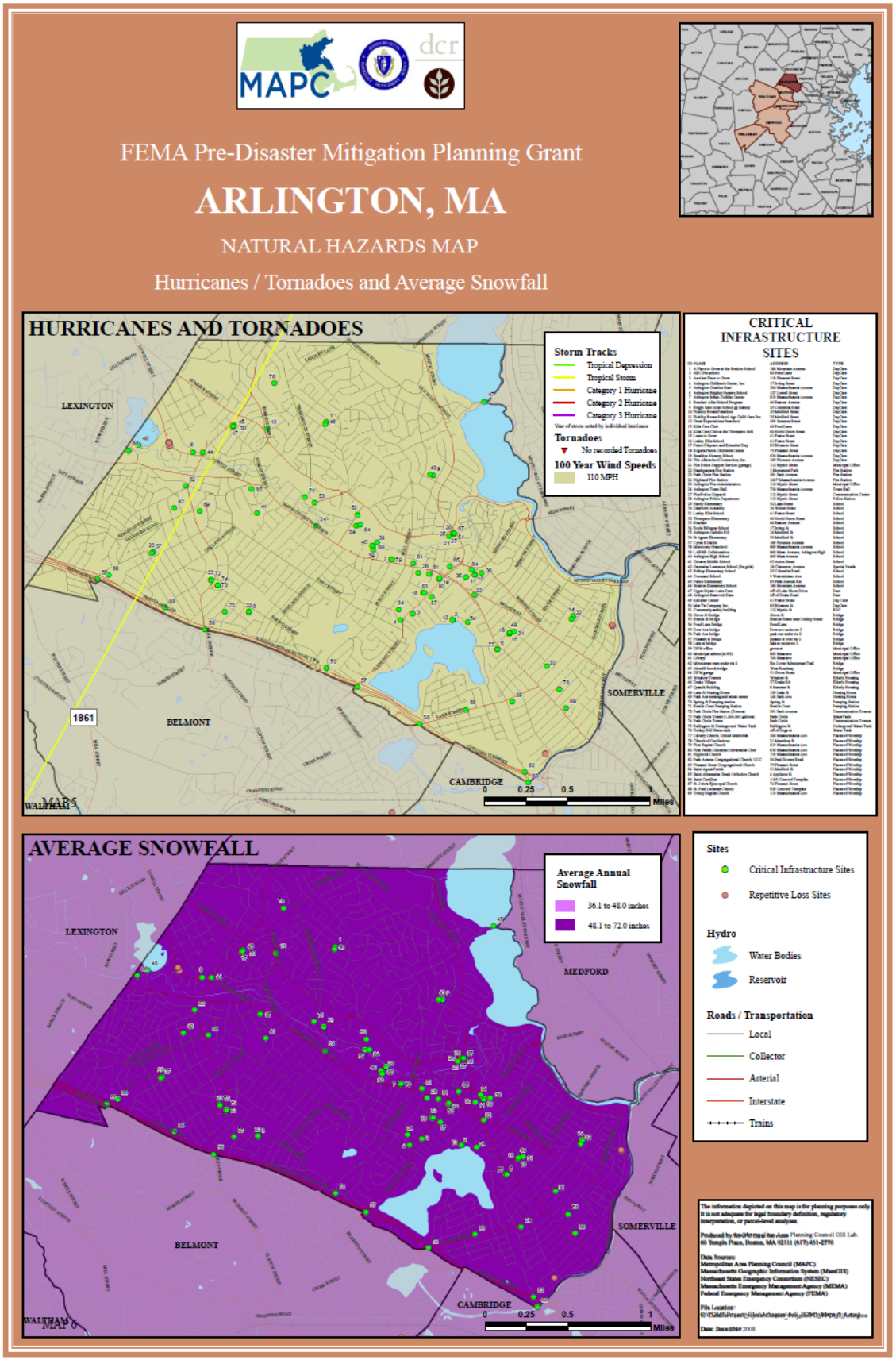
The information depicted on this map is for planning purposes only. It is not adequate for legal boundary definition, regulatory interpretation, or parcel-level analysis.

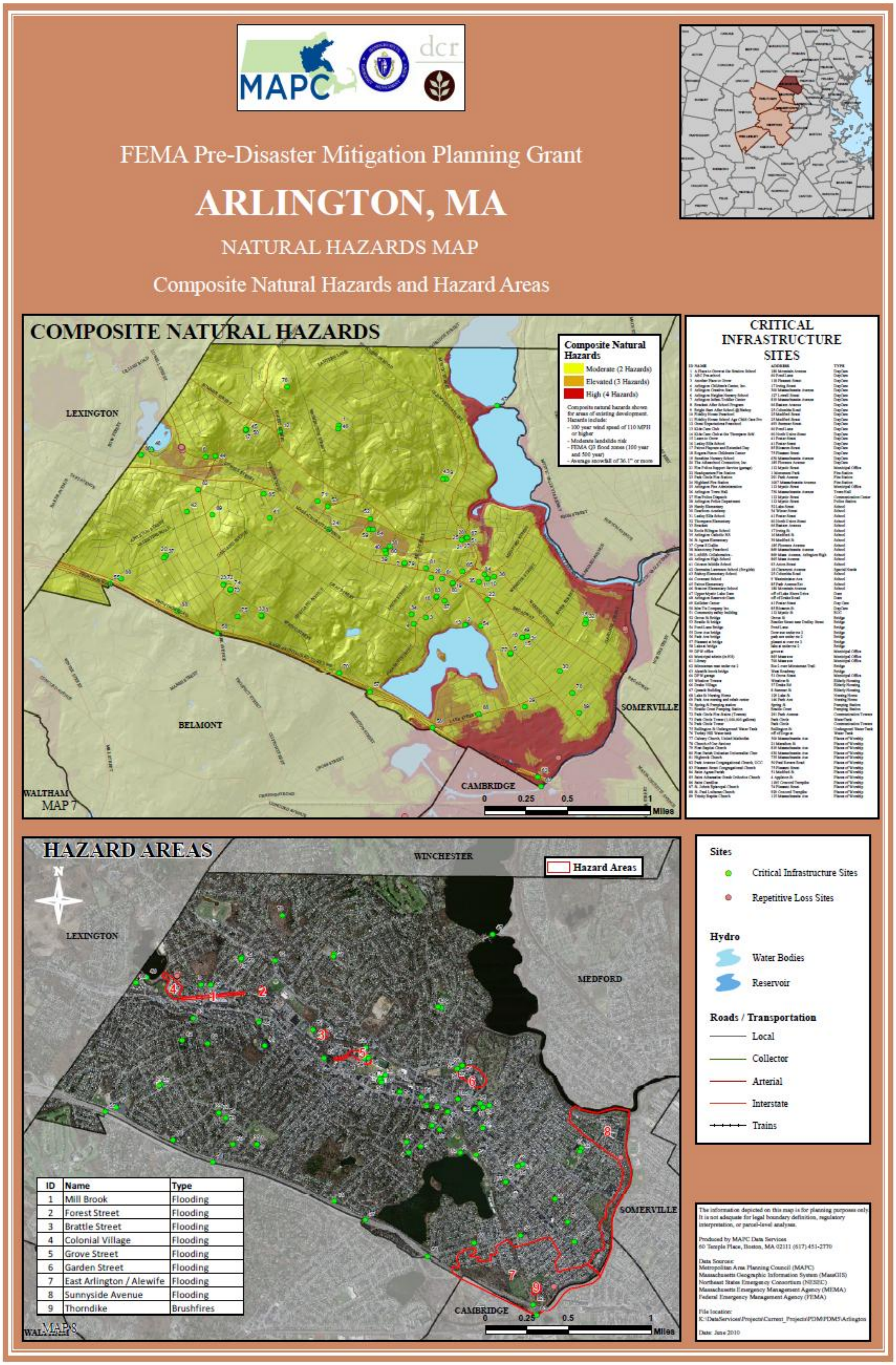
Produced by MAPC Data Services
60 Temple Place, Boston, MA 02111 (617) 451-2770

Data Sources:
Metropolitan Area Planning Council (MAPC)
Massachusetts Geographic Information System (MassGIS)
Northeast States Emergency Consortium (NESEC)
Massachusetts Emergency Management Agency (MEMA)
Federal Emergency Management Agency (FEMA)

File location:
K:\DataServices\Projects\Current_Projects\PDM\PDM5\Arlington

Date: June 2010


MAPC
dcr
FEMA Pre-Disaster Mitigation Planning Grant
ARLINGTON, MA
NATURAL HAZARDS MAP
Hurricanes / Tornadoes and Average Snowfall
HURRICANES AND TORNADOES
Storm Tracks
Tropical Depression
Tropical Storm
Category 1 Hurricane
Category 2 Hurricane
Category 3 Hurricane
Tornadoes
No recorded Tornadoes
100 Year Wind Speeds
110 MPH
LEXINGTON
BELMONT
SOMERVILLE
CAMBRIDGE
WALTHAM
1861
0 0.25 0.5 1 Miles
CRITICAL INFRASTRUCTURE SITES
AVERAGE SNOWFALL
Average Annual Snowfall
36.1 to 48.0 inches
48.1 to 72.0 inches
MEDFORD
Sites
Critical Infrastructure Sites
Repetitive Loss Sites
Hydro
Water Bodies
Reservoir
Roads / Transportation
Local
Collector
Arterial
Interstate
Trains


MAPC
dcr
FEMA Pre-Disaster Mitigation Planning Grant
ARLINGTON, MA
NATURAL HAZARDS MAP
Composite Natural Hazards and Hazard Areas
COMPOSITE NATURAL HAZARDS
Composite Natural Hazards
Moderate (2 Hazards)
Elevated (3 Hazards)
High (4 Hazards)
LEXINGTON
BELMONT
SOMERVILLE
CAMBRIDGE
WALTHAM
MAP 7
0 0.25 0.5 1 Miles
CRITICAL INFRASTRUCTURE SITES
HAZARD AREAS
WINCHESTER
Hazard Areas
LEXINGTON
MEDFORD
SOMERVILLE
CAMBRIDGE
MAP 8
ID Name Type
1 Mill Brook Flooding
2 Forest Street Flooding
3 Brattle Street Flooding
4 Colonial Village Flooding
5 Grove Street Flooding
6 Garden Street Flooding
7 East Arlington / Alewife Flooding
8 Sunnyside Avenue Flooding
9 Thorndike Brushfires
Sites
Critical Infrastructure Sites
Repetitive Loss Sites
Hydro
Water Bodies
Reservoir
Roads / Transportation
Local
Collector
Arterial
Interstate
Trains
Date: June 2010

APPENDIX C
DOCUMENTATION OF PUBLIC MEETING

Town of Arlington, Massachusetts
730 Massachusetts Ave., Arlington, MA 02476
Phone: 781-316-3000

webmaster@town.arlington.ma.us

Selectmen's Agenda 06-21-2010

TOWN OF ARLINGTON
BOARD OF SELECTMEN

Meeting Agenda
Monday, June 21, 2010
7:15 p.m.

FOR APPROVAL

1. CONSENT AGENDA (one vote required for approval of all items)
   a. Request: Friends of Arlington Council on Aging Road Race, September 12, 2010
      Art Budnick, President, Friends of ACOA
   b. FY2010 Transfer Request
      Brian F. Sullivan, Town Manager

2. Comcast Conduit Installation Petition/Ridge Street
   Richard Gallagher
   (all abutters notified)

3. Vote: Request for Conflict of Interest Determination
   30-50 Mill Street, WP East Development Enterprises, LLC
   Eugene Lucarelli, Esq.

4. Presentation: Draft Town of Arlington Hazard Mitigation Plan
   James Freas, Metropolitan Area Planning Council

APPOINTMENTS

5. Appointments: Tree Committee
   Clarissa Rowe
   Jim Dodge
   Mary Ellen Aronow
   Eliza Burden
   Lisa Decker
   Andrew Fischer
   Patti Muldoon
   Sally Naish
   Walter Phillips
   Ed Trembly
   Greg Watt
   Corinna Vanderspek
   (terms to expire 6/2013)

6. **CITIZENS OPEN FORUM**

   Any matter presented for consideration of the Board shall neither be acted upon, nor a decision made the night of the presentation in accordance with the policy under which the Open Forum was established.

TRAFFIC RULES & ORDERS/OTHER BUSINESS

7. Request: One Handicap Parking Space @ Arlington Animal Clinic, 191 Broadway
   Jennifer Wolcott-Schickler, VMD

8. Vote: Special Municipal Employee/Zoning Bylaw Review Committee
   Gregory Flaherty, ZBRC Chair

9. Sunnyside Wetlands-Wetland Cattail Marsh Issue
   Diane Mahon, Chair

10. Approval: Draft Plans/Bike Signs, Arlington Center

APPENDIX D
DOCUMENTATION OF PLAN ADOPTION

OFFICE OF THE BOARD OF SELECTMEN

730 MASSACHUSETTS AVENUE
TELEPHONE
781-316-3020
781-316-3029 FAX

TOWN OF ARLINGTON
MASSACHUSETTS 02476-4908

CERTIFICATE OF ADOPTION
TOWN OF ARLINGTON, MASSACHUSETTS
BOARD OF SELECTMEN
A RESOLUTION ADOPTING THE TOWN OF ARLINGTON
HAZARD MITIGATION PLAN

WHEREAS: a Local Hazard Mitigation Planning Committee, composed of staff from a number of different Town Departments, worked with the Metropolitan Area Planning Council to prepare the Town of Arlington Hazard Mitigation Plan; and

WHEREAS: the Town of Arlington Hazard Mitigation Plan contains several potential future projects to mitigate potential impacts from natural hazards in the Town of Arlington; and

WHEREAS: a duly-noticed public meeting was held by the Board of Selectmen on April 30, 2012; and

WHEREAS: the Town of Arlington authorizes responsible departments and/or agencies to execute their responsibilities demonstrated in the plan.

NOW, THEREFORE, BE IT RESOLVED that the Town of Arlington Board of Selectmen adopts the Town of Arlington Hazard Mitigation Plan in accordance with Title I, Article 2, Section 1, of the Bylaws of the Town of Arlington.

SELECTMEN
OF THE
TOWN
OF
ARLINGTON

A true record
ATTEST:
By: _____
Board Administrator